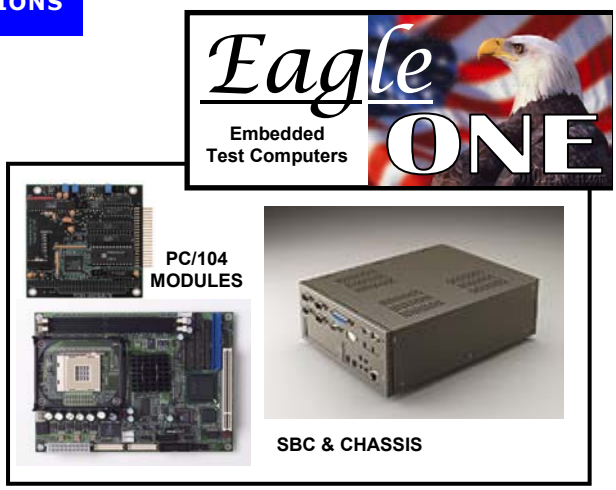
EMBEDDED TEST SOLUTIONS

ProbeStar
Smart Solutions for Electronics Test

Eagle ONE
Embedded Test Computers



Eagle-1

Pentium-based, Embedded Test Computers

BENEFITS

- *Significant cost savings over PXI/ VXI test platforms*
- *Compact enclosure is perfect for limited space applications*
- *Select from a host of processors, memory devices, Windows OS, PCI-bus and PC/104 modules.*
- *Starting price is just $1199 in single qty*

APPLICATIONS

- *Automated PCB and System-level Functional Test*
- *Custom Instrument Control*
- *Commercial ATE*
- *Environmental Stress Screen*
- *Quality Assurance/Control*
- *Research & Development*

MAIN FEATURES

Compact Enclosure

- *Rugged aluminum construction*
- *Built-in 80 watt Power Supply*
- *Extension windows for PC-104 and custom I/O*
- *2U height for Rack installation*
- *Well ventilated, with system cooling fan*

Single Board Computer

- *Fully integrated PC in a compact (5.25" x 8" form-factor)*
- *Supports Socket 370 Celeron®/ Pentium® III processors up to 850 MHz*
- *System I/O (4 serial ports, 3 Ethernet ports, 2 USB ports, 1 Parallel, Mouse, Keyboard, and VGA port).*
- *1 PCI slot, plus PC-104 interface*

The Eagle-1 is a true low-cost alternative to expensive and complicated PXI or VXI-based test equipment. For manufacturers seeking to automate Production Test processes, the Eagle-1 delivers a new level of compactness, flexibility and affordability.

Embedded Test Solutions

The Eagle-1 is an integral part of ProbeStar's ETS Series - Embedded Test Solutions. The ETS Series is a smart collection of (hardware and software) components and tools that are designed to reduce the high Cost-of-Test, while providing Test Engineers greater flexibility and more opportunities to apply test automation.

The truth of the matter...

Unless you are testing a new military weapons guidance system for example, then for most Functional Test projects the cost of implementing a VXI/PXI system is simply too expensive. To illustrate our point, the table below highlights the price difference between a comparably equipped Eagle-1 system and a standard 4-slot PXI system. Not only is the Eagle-1 priced over 46% less, but it requires 70% less power, it is over 40% smaller in size, and offers greater system I/O and expansion capabilities.

	4 Slot PXI Controller & Chassis	**Eagle-ONE**
CPU	850MHz Intel Pentium III	850MHz Intel Pentium III
RAM	512 MB	512 MB
Cache	256 MB	256 MB
Hard Drive	120GB	120GB
10/100BaseT Ethernet ports	1	3
USB ports	1	2
Serial ports	1	4
VGA, Printer, Mouse	✓	✓
Expansion	4, 3U PXI Slots	1 PCI Slot, plus a PC/104 Interface
Operating system	Windows XP/2000	Windows XP/2000
Chassis dimensions (in)	8.5(L) x 10.1(W) x 7.5(H)	11.8(L) x 8.9(W) x 3.6(H)
Power	275 Watts	80 Watts
Forced-air cooling	✓	✓
System Cost	**$ 3,600.00**	**$ 1,939.00**

Eagle ONE
Embedded Test Computers

Overview

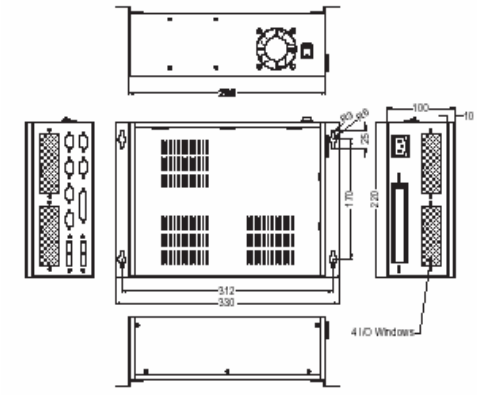
The Eagle-1 is a highly integrated industrial-grade PC system that is specifically designed to bring low-cost automation capabilities to any Production Test environment. The Eagle-1 is housed in a compact aluminum enclosure which includes a powerful Intel-based Single Board Computer, extensive System I/O resources, Hard Disk, Power Supply, and for easy expansion (a single PCI-bus slot, plus PC-104 interface).

System Enclosure

In today's manufacturing factory, desktop space is always in high demand but scarce supply. The compact Eagle-1 system enclosure is 30% smaller than a typical Baby-AT PC case and will accommodate a wider range of applications including portable, desktop, wall-mount or inside a custom rack.

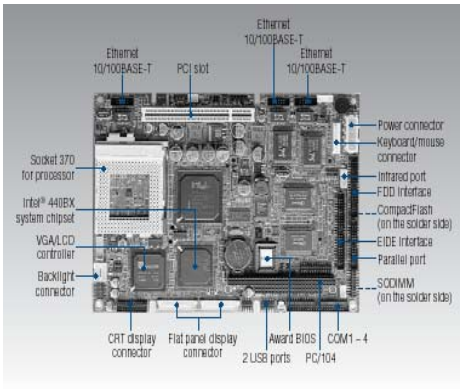
The Eagle-1 integrates well with custom hardware, supported by a single PCI-bus slot and the PC/104 interface. The enclosure provides (4) blank "window" plates which are positioned on two sides. The user is free to customize the window plates with a variety of panel-mount connectors, (or leave open) for easy access and routing of external cable assemblies.

With an enhanced forced air cooling system and 80-watt power supply, the Eagle-1 assures risk-free operation in the most demanding applications.



... powered by ProbeStar

The engine that drives the Eagle-1 is a high performance feature-packed SBC (Single Board Computer). The industrial standard (5.75" x 8.0") SBC is based on Intel's Socket 370 architecture and will support both Celeron and Pentium-III processors up to 850MHz.



The Eagle-1 SBC offers a wide variety of system memory devices (SDRAM and Cache), as well as an assortment of 2.5" Hard Drives (maximum 512MB and 250GB, respectfully).

Extensive System I/O

In addition to standard I/O, including (3) 10/100BaseT Ethernet ports, keyboard, video, and mouse ports, the Eagle-1 SBC provides extensive extended I/O for easy connectivity to external instruments or other peripherals.

Use the (2) USB ports for connection to a ProbeStar CD drive for easy software installation, or other standard PC peripherals such as USB speakers, printer, or memory sticks. Use the IEEE 1284 ECP/EPP parallel port to connect to a wide variety of devices, such as tape backup drives, printers, and scanners. The (4) RS-232 ports are available for connecting to a host of serial devices (e.g., bar code readers, external test equipment, wireless modems, and other computers).

PCI SIG
EMBEDDED-PC PC/104 MODULES

beyond expansion...

Get maximum flexibility to test, measure, acquire and control your next Functional Test project.

The Eagle-1 incorporates not just one but (2) proven expansion buses, the PC/104 interface and a single high-speed PCI-bus slot. Just within the test and measurement industry alone, the total number of available PCI and PC/104 plug-in cards could easily fill a small stadium. In addition to the bountiful selection, chances are good the PC card you choose for your Eagle-1 will likely cost between 30% to 60% less than a comparable PXI card.

What about software?

The Eagle-1 comes standard with Microsoft Windows XP Professional operating system (the customer can optionally select Windows 2000 or Linux). The Eagle-1 is compatible with all major test software development languages (including those from National Instruments, Agilent, Measurement Computing, Microsoft and others).

ProbeStar *ADVANTAGE*

Discover the ProbeStar ADVANTAGE for yourself. Tap into our extensive knowledge of computer control, instrumentation, ATE design, fixturing and system programming. Our Application Engineers are seasoned veterans who are passionate problem solvers and eager to help you succeed.

So give us a call today, let us show you how the Eagle-1 can greatly expand your opportunities to apply automated test, while significantly reducing both the complexity and high Cost-Of-Test.

Eagle ONE
Embedded Test Computers

SPECIFICATIONS

Single Board Computer

CPU	Socket 370 Celeron®/Pentium® III processor up to 850 MHz
System Memory	SDRAM 144-pin SODIMM x 2, Max 512 MB
2nd Cache Memory	128 KB on the Celeron® processor, 256 KB on the Pentium®III
System Chipset	Intel 440BX AGPset, 100MHz FSB
BIOS	AWARD 256 KB Flash BIOS
SSD	Supports CompactFlash™ card
Watchdog Timer	1~62 sec, 62 level timer intervals, systems reset or IRQ11
Expansion	1 x PCI slot, PC/104 interface
Battery	Lithium 3V/196 mAH
MIO	1xEIDE (Ultra DMA33), 1xFDD, 1xK/B, 1xMouse, 1xLPT, 1xRS-232/422/485,3XRS-232
IrDA	115 kbps, IrDA 1.0 compliant
USB	2 USB host port, USB 1.1 compliant
Ethernet Chipset	Intel® 8255ER x3, Optional Intel® 82559 x3 or RTL 8139C x3
Ethernet Interface	Three PCI IEEE 802.3u 100BASE-T Ethernet, Built-in Boot, ROM in Flash BIOS
Display Chipset	SMI LynxEM+ 712 (option Lynx 721)
Memory Size	2 MB (Optional 4 MB)
Resolution	CRT Mode: 1280 x 1024 @ 16 bpp (60 Hz), 1024 x 768 @ 16 bpp (85 Hz), 800 x 600 @ 24 bpp (85 Hz) LCD/ Simultaneous Mode: 1280 x 1024 @ 16 bpp (60 Hz), 1024 x 768 @ 16 bpp (60 Hz), 800 x 600 @ 24 bpp (60 hz)
LCD Interface	Supports 3,9,12,24,36-Bit TFT and 16 ir 24 Bit-bit DSTN Panel, Optional support up to 48 bit TFT or two 18/24 bit TFT LCD (Lynx 721)
TV-out (optional)	Supports both NTSC/PAL, S-video and composite video

** Product specifications and pricing are subject to change without notice*

System Enclosure

Power Supply

• Output Rating	80 Watts
• Input Voltage	100-240V_{AC}Auto
• Input Frequency	50-60 Hertz
• Output Voltage	5V@12A, 12V@1A
• Temperature	0-45Deg/C
• Operating Humidity	0%-85%
• Safety	UL, CE LVD certificated

Chassis Dimensions

• Mechanical (inches)	8.5(L) x 10.1(W) x 7.5(H)
• Weight	2.6kg.
• Cooling	6cm x 6xm fan

Ordering Information

Eagle-1 Base System	ETS110-1000-PS	$ 1199.00
1ea Single Board Computer 1ea Compact Enclosure 1ea Windows XP-PRO, OS System I/O (4 serial ports, 3 Ethernet ports, 2 USB ports, 1 Parallel, Mouse, Keyboard and VGA port). Complete assembly and test 1 year warranty (parts and labor) **Base system does not include processor, memory or hard drive*		
Operating System		
MS Windows		
XP-PRO	ETS110-1011-PS	No charge
2000	ETS110-1012-PS	No charge
Llinux	Coming soon	
Processors		
Celeron®		
566Mhz	ETS110-1014-PS	$ 50.00
733Mhz	ETS110-1015-PS	$ 55.00
850Mhz	ETS110-1016-PS	$ 60.00
Pentium® III		
700Mhz	ETS110-1017-PS	$ 120.00
850Mhz	ETS110-1018-PS	$ 130.00
Memory		
32MB RAM	ETS110-1019-PS	$ 36.00
64MB RAM	ETS110-1020-PS	$ 40.00
128MB RAM	ETS110-1021-PS	$ 76.00
256MB RAM	ETS110-1022-PS	$ 178.00
Hard Drive		
40GB	ETS110-1023-PS	$ 95.00
120GB	ETS110-1024-PS	$ 145.00
250GB	ETS110-1025-PS	$ 375.00
Options		
PCI Riser Card	ETS110-1026-PS	$ 42.00
GPIB, PC/104 Card	ETS110-1101-PS	$ 299.00
KMM-PAQ	ETS110-1027-PS	$ 429.00
(Keyboard, Mouse and 17" LCD Monitor Package)		
USB CD drive	ETS110-1028-PS	$ 89.00

Eagle ONE
Embedded Test Computers

PC/104 CARDS

MEASUREMENT COMPUTING

Known for their market leadership in the design and manufacture of computer-based test and measurement hardware and software, MCC (Measurement Computing Corp.), has joined forces with ProbeStar to compliment the Eagle-1 with an array of low-cost PC/104 cards. These products include analog and digital I/O boards, a GPIB interface and Relay control. MCC has taken the hassle out of low-level device programming with its Universal Library which is a complete set of I/O routines that encompasses all of their data acquisition hardware.

PC104-GPIB

High Performance IEEE-488.2

- Complete Talker/Listener/Controller
- Uses powerful CB7210.2 Chip
- 1MB/sec, Data Transfer rate
- REP-INSW block transfer
- 1024-word FIFO buffer
- 7 interrupt lines, shared capability
- Includes GPIB library software

ETS101-1101-PS, $299.00

PC104-DAS16JR/16

100KHZ A/D, 16 Bit, 16 SE or 8 DI

- 16-Bits Input resolution
- 16 chan SE / 8 chan diff
- Prog. Ranges: ±10V, ±5V, ±2.5V,
- ±1.25V, 0 to 10V, 5V, 2.5V, 1.25V
- Range software programmable
- Trigger/timing
- 8 digital I/O bits, 4 in, 4 out
- 512 Sample FIFO
- 3, 16-bit Counter/Timers

ETS101-1102-PS, $499.00

PC104-DAS16JR/12

125KHZ A/D, 12 Bit, 16 SE or 8 DI

- 12-Bits Input resolution
- 16 chan SE / 8 chan diff
- Prog. Ranges: ±10V, ±5V, ±2.5V,
- ±1.25V, 0 to 10V, 5V, 2.5V, 1.25V
- Range software programmable
- Trigger/timing
- 8 digital I/O bits, 4 in, 4 out
- 512 Sample FIFO
- 3, 16-bit Counter/Timers

ETS101-1103-PS, $399.00

PC104-DAC06

6 Channel, 12 Bit D/A

- 12-bit resolution
- Ranges: ±10V, ±5V, 0-10V, 0-5V
- Output current: ±5 mA, min
- Output resistance: <0.1 Ohm
- Short circ. current: 40 mA min
- Range selection: Jumper
- Output settling: 25 uS typ, 40 uS max
- Updates: Independent or simultaneous

ETS101-1104-PS, $399.00

PC104-DIO48

48 Channel Digital I/O Two 82C55 - 50 Pin Conn.

- I/O bits: 48 (DIO48)*
- Configuration: Two 82C55 chips
- Logic family: CMOS

*I/O bits: 24 divided into two 8-bit and two 4-bit ports. Each port can be set as input or output.

ETS101-1105-PS, $99.00

PC104-PDISO8

8 Electro Mechanical Relays 8 Isolated (500V) Inputs

- Relays: 5 Form C, 3 Form A NO
- Contact rating (DC): 2A at 28VDC
- Contact rating (AC): 0.6A at 120VAC
- Contact type: Gold overlay silver
- Contact resistance: 100 mOhms max
- Life: 100 Million operations, min
- Type: Opto-isolated, non-polarized.

ETS101-1106-PS, $249.00

www.mccdaq.com

Users now have two sources for superior service and support, contact ProbeStar directly or visit the Measurement Computing website. In either case you will find complete technical data sheets and detailed specifications for every product listed here. You can also get Application Notes, software downloads, new product presentations, information on accessories and much, much more. ProbeStar and Measurement Computing Corp., the power of two—working together for you.

OPTIONS/ACCESSORIES

ProbeStar has assembled an impressive collection of high quality products to support the Eagle-1. Our goal is to supply the tools you need to combat the high Cost-of-Test. We fully recognize the difficult tasks Test Engineers face everyday, and we are working very hard to create 'Smart Solutions' that overcome tough challenges. The products listed here are a small sample of what's available to the User, and the list is growing month by month. If there is a product that you would like to see included, or you have a concern regarding any area of our business, please contact us - we welcome your feedback.

KMM-PAQ

PS/2 Keyboard, Mouse & 17" LCD Monitor

Save yourself the hassle of searching for a spare keyboard, mouse or monitor to use with your Eagle-1, ProbeStar has packaged together the economical KMM-PAQ.

*LCD monitors are purchased on-the-spot market and may be refurbished.

ETS101-1027-PS, $429.00

External USB CD-ROM Drive

The perfect compliment for your Eagle-1, the ProbeStar CD-ROM drive. This drive has a USB interface making it an easy plug-and-play device for loading application programs. ***Free Offer:*** For a limited time the USB CD-ROM Drive will be included FREE with each purchase of the KMM-PAQ.

ETS101-1028-PS, $89.00

PowerBASIC for Windows

Very fast, very tight code.

At $149 'PowerBASIC for Windows' has all of the bells and whistles found in most text-based compliers, but is available for a fraction of the cost. Use PowerBASIC to create test programs like you normally would (e.g., link instrument drivers, set breakpoints for debugging, build a GUI and quickly create DDL's or Exe's). Don't let the low price fool you - there is a reason it's called PowerBASIC.

ETS101-1029-PS, $149.00

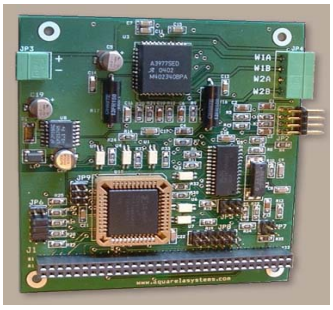
X-Tool™

PC/104 Board Separator

Offering a simple and quick method for removing PC/104 system components without bending or damaging header pins. The X-Tool™ separates PC/104 modules located on the Eagle-1 Single Board Computer. ***Free Offer:*** Purchase any PC/104 products totaling $500 or more and receive one FREE X-Tool.

ETS101-1030-PS, $20.00

PC/104 Stepper Motor Controller



- 1 AXIS Bipolar
- 10 to 24 V.
- 3 amp
- Low Profile, High Efficiency, Mosfet Drivers
- Opto Isolated
- Thermal Overload Protection
- 2 Digital Input
- 1 Analog Input

ETS101-1107-PS, $149.00

PCI Riser Card

The PCI Riser Card is installed into the single PCI slot and gives the Eagle-1 access to a host of test and measurement related PC cards. ***Free Offer:*** For a limited time the PCI Riser Card will be included FREE with each purchase of the Eagle-1 base system.

ETS101-1026-PS, $42.00

APPLICATION NOTE 101

A practical board-level strategy for testing next-generation SDIO Memory devices

The Company
Vulcan Technology is a start-up company that has developed a new line of *ultra-dense* SDIO (Secure Digital Input Output) memory cards. The worldwide market for SDIO cards is enormous but the profit margins are slim, so the company exec's knew in order to be successful they must deploy a super efficient Manufacturing process.

The Problem
By far the biggest cost in the Manufacturing process is in testing each device (~38%). These memory devices have a huge capacity (>1000 GB) , and although sophisticated memory test patterns were adopted to reduce the overall test-time the accumulative time-span is still large (6 minutes per unit).

The Solution
To address the testing challenge the company decided it needed to build a group of custom Automated Test Systems that had two critical objectives, (1) minimize test-time without sacrificing test coverage and (2), maximize though-put. In addition to satisfying an exhaustive suite of Functional Test requirements, at the end of the test each device must be loaded with important company info and a unique serial number.

To achieve the two objectives stated above the company devised a test strategy to take full advantage of the 'panelized PCB's'. Each panel contained (12) SDIO PCB's and each SDIO device would be tested independently, while simultaneously as a group.

System Overview
To the right, Figure 1.0 highlights the various functional blocks of the SDIO PCB Automated Test System. The heart of the system is the Eagle-1, Embedded Test Computer. The Eagle-1 incorporates two high performance PC expansion boards, a PCI-based Data Acquisition card and a PC/104-based Stepper Motor Controller card. These two boards are designed to support the Fixture Control System.

Fixture Control System
With clever use of low cost robotics it was decided the tester should be built with a custom motorized handler. The handler would be designed to project a cradle assembly from the front of the fixture (much like a CD drive), where the Operator can then place the SDIO PCB panel (or DUT).

The handler would then retract into a holding compartment which has the capacity of storing a stack of (10) panels. Each DUT is mechanically lowered down one-by-one through the holding compartment to the test bed (bed-of-nails platform). Once there, the DUT is forced to make electrical contact with the spring-probes and the test process can begin. After the test is complete, the DUT is released from the test bed, placed in a different cradle assembly and moved out of the fixture for the Operator to retrieve.

The Fixture Control System is responsible for all of the robotic functions required to properly transport the SDIO panels through the handling process (including the bed-of-nails platform). The Fixture Control System is a collection of stepper motors, limit switches, proximity sensors, solenoid relays and other safety devices—all managed and controlled by the Eagle-1.

SDIO Interface Board
The actual functional test sequence is performed by the SDIO Interface Board. Each of the (12) SDIO devices on the DUT is driven by a separate proprietary FPGA chip. The FPGA is a state-machine that produces the timing necessary to interface with the SDIO device. The FPGA also contains a high-speed ALU (Arithmetic Logic Unit), to validate the test vectors in real-time.

The (12) FPGA's are 'slaves' to an embedded microcontroller which is designed to receive high-level commands from the Eagle-1 (via RS-232). The Eagle-1 sends commands to the microcontroller and then polls it once a second for status.

System Software
In addition to controlling the Fixture Control System and the SDIO Interface Board, the system software must be designed to supervise Operator input, scan the bar-code reader, dump results to a printer and manipulate a data-base on the local network. When selecting a software language for this application, the company considered brands from the major suppliers but because of the cost-sensitivity of the project, and the need for high-performance, the company choose SoftWIRE from Measurement Computing Corporation.

Conclusion
The combined cost savings from the Eagle-1 (its plug-in cards and the SoftWIRE software), afforded the company the opportunity to incorporate more advanced capability into the Automated Test System. In doing so, the company was not only able to meet its test objectives but they achieved a level of efficiency that exceeded all expectations.

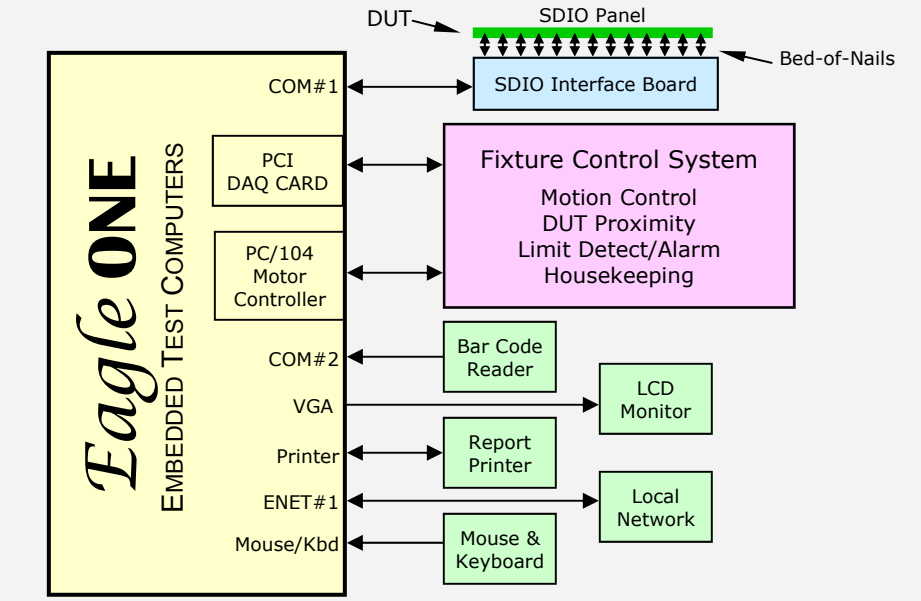


Figure 1.0, Eagle-1 SDIO PCB Automated Test System