

PrecisionBook

Technical White Paper

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TADpole  **Rdi**

Portable Unix Workstations and Servers for a Mobile World

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1. PrecisionBook Overview

1.1 Introduction

This document describes the PrecisionBook from Tadpole-RDI. The PrecisionBook combines the high performance of the PA-7300LC processor (132MHz and 180 MHz) and HP-UX 10.20 operating environment into a portable package.

The PrecisionBook, weighing in at 7.5 lbs. and providing 100% binary compatibility with Hewlett-Packard's operating system, supports up to 18GB of internal removable robust disk storage and RAM configurations up to 512MB.

With an impressive 14.1" display driven by the HP VISUALIZE-EG graphics, the PrecisionBook is an ideal tool not just for presentations, demonstrations and training, but for advanced engineering applications and high-end graphic image applications.

The PrecisionBook can be easily carried between sites, has technology designed for performance, portability and robustness allowing the user true desktop functionality at work, home, or on the road.

1.2 Target Markets and Applications

Any company developing, selling or utilizing applications on a PA-7300LC, Class B workstation. The user will have a portable/mobile requirement e.g.

Feature	Benefit
Full PA-7300LC CPU functionality	Runs unmodified HP-UX 10.20, ensuring 100% binary compatibility with HP compliant applications.
Weight 7.5 lbs.	Can be easily transported between office, customer site, home office and other locations.
Internal, removable hard disk drives, up to 18GB	User can quickly swap between different environments, e.g. Trainer: Multiple courses. SE: Different demonstrations or presentations. Can always return to known working system. Multi-purpose: Switch between personal, demo or test environments within minutes. Increased system utilization by using unit for different purposes. Disks removable for security of data.
Portable size provides ability to hand carry	Reduced shipping costs. Reduced time the system is out of use, i.e. no need for packing and shipping in advance. Efficient and economical transit, no need to arrange shipment. Save time in setup/finding equipment
Use	Key features/benefits
SE for Demonstration	Increased sales/demonstration productivity.

	Reduced shipping costs. Controlled and consistent demonstration environments.
Training	Efficient set up. Lower shipping costs. Increased system utilization.
Show/Exhibition Demos	Reduced shipping costs. Controlled demonstration environment. Removable disk drives for maximum security.
Developer/Consultant	Full Architecture / Operating system compatibility. Single system with multiple personalities via removable hard disks for: benchmarking, data analysis working at home, working in office, working at customer site.
Deployment	Portable system for temporary office, mobile command and control, on site data collection and analysis, mobile disaster recovery, etc.

1.3 Hardware Overview

The PrecisionBook features include the following:

- PA-7300LC RISC Processor (132MHz and 180MHz).
- Up to 512MB of ECC memory.
- 12.1-inch or 14.1-inch TFT active matrix color LCD display sizes available.
- Up to three user removable disk drives. Each drive contains a 2.5-inch IDE disk drive with an integrated Fast SCSI 2 controller.
- Optional secondary Cache of 1MB, standard configuration 128K cache.
- External SCSI 2 interface.
- Onboard 10MB network connection, 100MB available through PCMCIA slot.
- Dual PCMCIA slots, supporting two Type I/Type II cards, or one Type III card.
- Lithium battery increasing flexibility of system use.

The PrecisionBook can be simply "personalized" with hard disk drives, PCMCIA cards and memory modules which are easily installed and removed.

1.4 Operating System Support

The PrecisionBook is shipped with HP-UX 10.20 factory installed. Tadpole-RDI provides the binary version of the operating system without any source modifications. The PrecisionBook also runs 32-bit applications unmodified from the HP-UX 10.x operating system, allowing earlier applications to run seamlessly. The PrecisionBook supports the Common Desktop Environment (CDE) window system.

1.5 Security

- Disk drives are removable for security reasons.

2. Technical Specifications

2.1 Major components

Processor	180 MHz PA-7300LC	SPECint95: 9.06 SPECfp95: 9.35
	132 MHz PA-7300LC	SPECint95: 6.45 SPECfp95: 6.70
Cache	64KB data, 64KB instruction	
Secondary Cache	Optional 1MB	
Memory (ECC - 60ns)	*64MB - 512MB (*Min = 128MB on 180MHz System)	
Disks	Up to 3 x 6GB 2.5-inch IDE disk drives depending on configuration.	
Graphics	HP VISUALIZE-EG 2MB Frame Buffer memory (Supports 1600 x 1200 external monitors)	
Display Options	TFT Active matrix color LCD, 12.1" and 14.1" options 1024x768 resolution	

	<u>12.1-inch</u>	<u>14.1-inch</u>
Color palette	256K	256K
Grayscale levels	64	64
Pixel aspect ratio	1:1	1:1
Screen aspect ratio	4:3	4:3
Dot Pitch	.24mm	.28mm
Dots per inch	106	90.7
Display height (In mm)	7.26in 185mm	8.36in 214mm
Display Width (In mm)	9.69in 246mm	11.14in 286mm
Display Diagonal (In mm)	12.1in 308mm	14.1in 358mm

PCMCIA Supports (1) OR (2) Type I/Type II or (1) Type III

2.2 External Monitors

Supports up to 16 million colors and resolutions of 1600 x 1200, 1280 x 1024, 1024 x 768, 800 x 600 and 640 x 480.

2.3 Keyboard/Pointing Device

P/S2 standard, 97 travel keys, 3-button integrated trackpad.

2.4 Standard External Interfaces

Ethernet	10MB Twisted Pair port (100MB available via PCMCIA card)
SCSI	SCSI 2 (10MB/s)
Serial	Two RS-232C ports
Parallel	Centronics-compatible
Audio	16-bit audio, 48KHz sampling rate stereo internal speaker, and microphone jack
Video Port	SVGA style 15pin D sub

Mouse/Keyboard	6 pin, mini-DIN connector, PS/2 type
External Floppy	15-pin connector

2.5 Software

Operating System	HP-UX 10.20
Window system	CDE, OSF/Motif, X11 Window System
Network Support	AutoNET software tools, plus NCS, NFS, Berkeley 4.3 TCP-IP, BSD 4.3
Power Management	Power Tools supporting multiple power modes and battery management.

2.6 Optional External Floppy Drive

Floppy disk drive	3.5 inch
Capacity	1.44MB

2.7 Optional Fax/Modem

56K/bps PCMCIA fax/modem card

2.8 System Dimensions

Height	2.3-inches (58mm)
Width	12.84-inches (326mm)
Length	11.66-inches (296mm)
Volume	0.18cu. ft. (.005 cu. m)
Weight	7.5 lbs. (3.4kg) (w/o battery)

2.9 Battery

Li-Ion battery	40 watt-hour capacity
Run Time	1 to 2 hours (application dependent)
Recharge time	2.5 hours charging only
Weight	1.0 pounds (.45kgs)

Quickcheck status on battery pack.

2.10 AC Adapter Charger

Automatic voltage and frequency sensing	
Voltage	92 to 264 VAC
Frequency	47 to 63 Hz
Power Supply	70 W continuous
DC Output	19VDC @ 3.68 A
Length	5.24-Inches (133mm)
Width	2.28-Inches (58mm)
Height	1.15-Inches (29mm)
Weight	.58 lbs. (0.26kg)
AC Cord	2 terminal UL/CSA approved, 6ft (1.8M)
DC Cord	Locking connector, 3ft. (0.9M)
Safety	Class II, UL 1950, IEC 950, EN 60950

2.11 Power Management

- LCD blanking
- Graphics shutdown and low power mode
- Hard drive spin down
- User definable power management profiles

2.12 Other Standard Features

- Carrying case
- Simultaneous display capabilities with connection to XGA resolution
- External monitor or projection panel

2.13 Environmental

Altitude	0 - 10,000 ft. (0 - 3,048 m)
Operating	+40 degrees F to +104 degrees F (+4 degrees C +40 degrees C)
Storage	-4 degrees F to + 140 degrees F (-20 degrees C to +60 degrees C)
Temperature sensitive fan speed	

2.14 Regulatory Compliance

Safety	UL 1950, CSA C22.2 No 950, TUV (EN60950), CE
EMC	ITE - FCC Part 15 Class B, CE (EN55022 Class "B", EN50081-1, EN50082-1, IEC 801-2, IEC 801-3, IEC 801-4)

3. Description of Key Components/System Architecture

3.1 Processor Module

The system motherboard is a dual sided, 12.4-inch by 4.9-inch PCBA. This PCBA contains the processor and several embedded I/O controllers.

The performance ratings of the CPU are as follows:

	<u>132 MHz</u>	<u>180 MHz</u>
SPECint95	6.49	9.22
SPECfp95	6.54	9.43

The basic motherboard architecture is based on the HP B-class design. The HP B-class design consists of an HP 32-bit PA RISC 7300LC processor and processor complex, using two-way, super-scalar technology with 128 KB (64KB data, 64KB instruction) of primary cache on chip. The processor complex includes support for system address buffers, system clock generator, a data FET bus switch array and an optional external cache ram.

The processor complex supports the system processor and administers the GSC bus to low-level I/O functionality, including the Ethernet media access layer.

The PDH-bus is a low level peripheral interface providing connection to the flash boot memory, NVRAM, and PSM bus interface. The PSM bus provides connection to the system's intelligent power supply module.

3.2 System Memory

Memory on the PrecisionBook is accessed through a 144-bit data path. PrecisionBook memory includes ECC protection. The memory subsystem supports 60 ns memory modules.

PrecisionBook has available memory configurations of 64 MB to 512 MB. The memory is connected to the notebook through an opening in the bottom of the unit. Two memory slots are available but do not need to be filled to configure the system. The memory is field installable where the end user can access the memory modules and replace the two slots with higher capacity memory modules available through Tadpole-RDI.

With this memory scheme, four valid memory configurations are possible. The following table shows the memory card requirements for each memory configuration.

<u>Valid Memory Configuration</u>	<u>Memory Modules Required</u>
64 MB	2 - 32MB SIMMs
128 MB	1 - 128MB SIMM
256 MB	1 - 256MB SIMM
512 MB	2 - 256MB SIMMs

Memory upgrades can be performed by the end user, by replacing the currently installed memory modules.

3.3 Graphics Controller

3.3.1. HP VISUALIZE-EG

The base configuration of the PrecisionBook display controller is a Gecko System Connect (GSC) controller based on the HP Graffiti chip with a standard 2 MB frame buffer. The HP VISUALIZE-EG is one of the fastest 2D graphics device in the world and offers a large amount of flexibility in terms of user configurations. HP VISUALIZE-EG supports a variety of different resolutions and both 8 plane and 8/16 plane configurations. The HP VISUALIZE-EG graphics device supports advanced functionality that increases its utility, in addition to maintaining compatibility with the rest of the HP VISUALIZE family. Such features as HP Color Recovery, Multiple Color Look-up Tables, Display Power Management Signaling (DPMS) and the ability to use HP Single Logical Screen (SLS) ensure that the HP VISUALIZE-EG device will satisfy the needs of all 2D graphics users.

With the standard 2 MB Frame Buffer memory card, the HP VISUALIZE-EG can either add high resolutions (1600x1200) or be configured with 8 Overlay planes and 16 Image planes. These configurations fill two holes that exist in the HP VISUALIZE family of devices; adding previously unsupported resolutions for applications requiring extra real estate and adding an entry level (non-buffered) 3D graphics device that is ideal for applications using 3D wireframe or those requiring hardware double buffering.

3.3.2 External Monitors

The PrecisionBook can display to external monitors and supports up to 16 million colors and 256 grayscales. The following table lists the various external monitors supported by the graphics controllers.

External Monitor Compatibility Table

VGA	640x480
SVGA	800x600
XGA	1024x768
SXGA	1280x1024
	1600x1200
Frame rates	60Hz, 72Hz, 75Hz

The external monitor attaches to the system through a standard SVGA connector on the rear panel. The controller uses the HP VISUALIZE-EG graphics accelerator.

The PrecisionBook can display simultaneously on the internal 1024x768 LCD and external 1024x768 monitor or LCD projection panel and projector. If an external 640x480, 800x600, 1280x1024 or 1600x1200 CRT monitor is used, the internal LCD will not operate (i.e., it will be blanked).

3.4 Display Technology

3.4.1 14.1-inch 1024 x 768 Color Active Matrix TFT Display

Tadpole-RDI offers a 14.1-inch diagonal 1024 x 768 high resolution color liquid crystal display (LCD) that uses Active Matrix, Thin Film Transistor technology. The dimensions of the LCD are 8.36-inches in height and 11.14-inches in width. The display has a dot pitch of .28 mm with 90.7 dots per inch.

The on-board HP VISUALIZE-EG video controller provides a graphics accelerated display. The 14.1-inch 1024x768 display supports a color palette of 4K colors and 16 grayscales with 4K colors displayed simultaneously.

3.4.2 12.1-inch 1024 x 768 Color Active Matrix TFT Display

Also available is a 12.1-inch diagonal 1024 x 768 high resolution color liquid crystal display (LCD) that uses Active Matrix, Thin Film Transistor technology. The dimensions of the LCD are 7.26-inches in height and 9.69-inches in width. The display has a dot pitch of .24 mm with 106 dots per inch.

The on-board HP VISUALIZE-EG controller provides a graphics accelerated display. The 12.1-inch 1024x768 display also supports a color palette 4K colors and 16 grayscales with 4K colors displayed simultaneously.

3.5 Hard Disk Storage

PrecisionBook uses low profile, 2.5-inch IDE internal removable hard drives with an integrated Fast SCSI 2 controller. Each hard disk drive has 6 GB of formatted storage, 13 msec average access time with burst transfer of 5 MB/sec. These drives require 5V input and dissipate approximately 2 watts of power.

PrecisionBook supports up to three removable hard disk drives where the third drive replaces the battery. This provides an internal storage range of 6 GB to 18 GB.

3.6 Physical Packaging

The PrecisionBook provides a notebook-style package, while maintaining full workstation desktop configuration capability. The PrecisionBook has a weight of 7.5 lbs. (3.4 kg) and a footprint of 11.6 inches (29.6 cm) deep by 12.8 inches (32.6 cm) wide by 2.3 inches (5.8 cm) in height.

The keyboard is forward mounted in the base section of the PrecisionBook. The base section provides a comfortable palm rest for wrist support during extended use. The center positioning of the touchpad allows right- or left-handed usage.

The audio ports are located on the front right hand side of the unit for easy access to use speakers or headphones. Other ports with right side access include the PCMCIA port, the external floppy drive connector, and Fast SCSI 2 port. The drives are removable with quick release sliding latches found underneath the system. External keyboard plugs into connector at rear of system.

PrecisionBook utilizes an external AC adapter for non-battery operation and battery charging. The AC adapter measures 5.24-inch x 2.28-inch x 1.15-inch (133 mm x 58 mm x 29 mm) and weighs .58 pounds (.26 kg).

3.7 PCMCIA

The PrecisionBook is designed with a PCMCIA slot located on the right side of the system. The PCMCIA slot supports one or two Type I/Type II cards or one Type III card. Various PCMCIA cards can be used in the PrecisionBook, including fax/modems.

3.8 Keyboard and Touchpad

A full-sized, 97-key PS/2 integrated keyboard with 12 function keys is standard with each PrecisionBook. It provides all key functions as a US PS/2 keyboard. The keyboard has an integrated three button GlidePoint® touchpad. To move the cursor, simply place a finger on the touchpad and move across to

the position needed. Tap once on the pad to "click," twice to "double-click," and tap and hold to drag and highlight.

The PrecisionBook supports external PS/2 type domestic keyboards. The dual-ported keyboard controller supports simultaneous external and internal keyboard connection. With an external keyboard connected before power up, the keyboard controller detects its presence on boot up, and uses the external keyboard's country/layout code. If the internal keyboard's country/layout code is to be used instead of an attached external keyboard, the user must plug in the external keyboard after power up. The touchpad is also usable when an external mouse or an external keyboard with a mouse is connected.

3.9 Power Supply

The PrecisionBook gets power from the internal battery pack or by connecting the external 70 watt AC power adapter. This adapter operates from 92-264 VAC, at 47 to 63 Hz. The adapter provides 19 volt DC power input for running the system. International power cord options are available.

3.10 Battery Technology and Recharging

The battery pack used in the PrecisionBook is made up of nine Lithium-Ion cells packaged in one removable case. The 4050 mAH per cell battery pack typically provides 60 minutes of battery operation, depending on system configuration and power management mode. The battery pack supplies 11.1 volts DC (nominal) and weighs 1.0 pounds.

Tadpole-RDI has developed an intelligent battery management system relieving the user of battery management. The Lithium-Ion battery pack has no memory effect and the system will background charge the battery when connected to AC power. A utility called PowerTool allows the user to monitor the charge of the battery pack and can get up to the minute charge status. The battery pack has QuikCheck, an LED read out on the pack for immediate indication of the level of charge available for the battery pack.

The battery pack can be charged in 2.5 hours while the system is off and connected to the external power supply.

3.11 I/O

The following connectors are provided on the PrecisionBook:

Name	Description
SCSI Port	Fast SCSI-2
Ethernet	10MB/s Twisted Pair (10 Base T) or DB-15 AUI connector (100MB/s available via PCMCIA Card).
Serial Ports	2 x RS232 interfaces on 9-pin D-Type
Parallel	1 x 25-pin D-Type
Audio	Standard 16bit, 48 Khz interface with speaker and microphone jacks.

4. Accessories

4.1 Tadpole-RDI Supplied/Approved Items

NOTE: The accessories on this list are likely to be updated as customer requirements dictate, please contact Tadpole-RDI for latest product information or alternatively check Tadpole-RDI's web site at: <http://www.tadpolderdi.com>

The following items have been certified for compatibility by Tadpole-RDI for use with the PrecisionBook product, and may be supplied to the PrecisionBook user by Tadpole-RDI or obtained from another source. *Italics indicates items only available from Tadpole-RDI:*

PC Card (Modem)	Clippercom 56K Data/Fax Modem
PC Card (LAN)	D-Link DFE-650TX (10/100 MBs)
PC Card (Wireless Modem)	Contact Tadpole-RDI for latest product information
Tape Drive	Contact Tadpole-RDI for latest product information
<i>Floppy Drive</i>	<i>1.44MB</i>
<i>CD-ROM</i>	<i>24 Speed portable CD-ROM unit (US only)</i>
<i>Memory</i>	<i>Upgrades available to 512MB maximum per system</i>
<i>Disk</i>	<i>Additional disk drives, maximum of three disk drives per system (only two disk drives available with battery option)</i>

4.2 Compatible Items

The following items will not be specifically approved or supplied by Tadpole-RDI but are likely to be compatible with the PrecisionBook product:

- Keyboards - Most PS/2 keyboards
- Mice - Most PS/2 mice
- SCSI - Most SCSI items for which suitable driver software exists (e.g. Sun disks)
- Serial - Most serial items for which suitable driver software exists (e.g. modem)
- Parallel - Most parallel items for which suitable driver software exists (e.g. printer)
- Displays - Most third-party monitors, projectors or flat-panel displays.

5. Standards

5.1 Safety

US	UL
Canada	CSA C22.2 No. 950
Europe	CE 98, includes EN 60950

5.2 EMC

US	FCC Part 15 Class B
Canada	Accepts US approvals
Europe	EN 55022 (Emissions) EN 50081-1 EN 50082-1 (Immunity) IEC 801-2, 801-3, 801-4

6. Software

6.1 HP-UX Operating System

The PrecisionBook is loaded with Hewlett-Packard supplied HP-UX 10.20 as the base software environment, providing 100% binary compatibility with Hewlett-Packard's operating system. A Tadpole-RDI software CD is also supplied with each PrecisionBook.

Each PrecisionBook is shipped with the following software environment:

1. Factory loaded HP-UX 10.20 operating system
2. Right To Use (RTU) License from Hewlett-Packard
3. Factory loaded Common Desktop Environment (CDE)
4. Factory loaded Tadpole-RDI software: Power Management Tool and PCMCIA
5. Tadpole-RDI Software CD
6. HP-UX 10.20 CD set
7. Manual set and CD

6.2 Other Software Standards Compliance

- XGL
- NFS
- ONC+
- XFN/NIS
- TCP/IP
- POSIX
- CDE
- X11 R4/R5
- X/Open (XFN, xpg4/xcu4)

6.3 Tadpole-RDI Software

Tadpole-RDI software provides a set of GUI-accessible tools for PrecisionBook users. These include system and power management, serial driver, PCMCIA driver and others. PowerTool provides system and power management. The end user can select various power usage modes to extend battery life.

7. System Configurations

The capabilities of the PrecisionBook product may be changed by configuring the main unit, or by connecting additional items.

7.1 Shipping Configurations

The PrecisionBook product will be supplied in a specific configuration defined at time of purchase by -

- Processor speed.
- LCD display size.
- Disk capacity (defined by the number of disk drives and/or battery required).
- Memory capacity.
- Optional 1MB Level 2 cache.

7.2 System Upgrades

Changes to the main system configuration (as defined above) can be undertaken as a combination of field upgrade (i.e. by the user) or by returning the unit to a Tadpole-RDI approved service technician. The main upgrade items are critical to the performance of the product and must be purchased through an approved Tadpole-RDI channel:

- The processor module/system board can be upgraded as a return to factory option. Upgrade options will depend on which processor modules/system board are available at the time of upgrade.
- The memory is a field installable item. The upgrade involves purchasing additional PrecisionBook memory modules from Tadpole-RDI.
- The disk drives are field installable items. The upgrade involves purchasing additional PrecisionBook disk drives from Tadpole-RDI.

Contact Information

Tadpole-RDI Inc., 2300 Faraday Avenue, Carlsbad, CA 92008, USA
Tel: 1 800 734 5483, International +1 760 929 0992, Fax: +1 760 929 9702

Tadpole-RDI, 137 Ditton Walk, Cambridge, CB5 8FN, United Kingdom
Tel: +44 1223 278200, Fax:+44 1223 278201

World Wide Web: <http://www.tadpolderdi.com>

About Tadpole-RDI

Tadpole-RDI, a subsidiary of Tadpole Technology Plc, is the global leader in the design and manufacture of portable UNIX workstations and server systems for Sun and Hewlett-Packard environments. Its North American headquarters are based in Carlsbad, California and European operations in Cambridge, England. Tadpole-RDI is certified ISO-9001 and operates through a global network of specialist distribution channels providing applications in industry, commerce and government. Tadpole-RDI can be visited at www.tadpolderdi.com.

About Tadpole Technology Plc.

Tadpole Technology is a listed company on the London Stock Exchange and also pioneer of mobile Java solutions called Cartesia for the world's utilities and related industries. Leveraging developments in Java and intranet technology, Cartesia brings the full advantages of integrated corporate workflow to the mobile environment allowing utilities to deploy the first set of truly location-independent, platform-neutral business tools that generate reductions in IT costs and gains in mobile workforce productivity.