PrecisionBook 132/180

Hardware Reference Guide

431106302A

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Notes

Notice Disclaimer of Warranty

RDI Computer Corporation makes no representations or warranties with respect to this manual, and shall not be liable for technical or editorial omissions made herein; nor incidental or consequential damages resulting from the furnishing, performance, or use of this manual. Further, RDI Computer Corporation reserves the right to make chances in the specifications of the product described within this manual at any time without notice and without obligation of RDI Computer Corporation to notify any person of such revision or changes.

FCC Compliance Statement

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio and television reception. However, there is no guarantee that interference will not occur in a particular installation.

Declaration of Conformity

We, RDI Computer Corporation,
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Declare under our sole responsibility that the product

PrecisionBook Portable Workstation

complies with Part 15 of FCC Rules. Operation is subject to the following two conditions: 1) this device may not cause harmful interference, and 2) this device must accept any interference received, including interference that may cause undesired operation.

If this equipment does cause interference to radio and television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna. Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Shielded Cables

Connections between the PrecisionBook workstation and peripherals must be made using shielded cables in order to maintain compliance with FCC radio frequency emission limits.

The connection of nonshielded equipment interface cable to this equipment will invalidate the FCC Certification of this device and may cause interference levels that exceed the limits established by the FCC for this equipment. It is the responsibility of the user to obtain and use a shielded equipment interface cable with this device. If this equipment has more than one interface connector, do not leave cables connected to unused interfaces.

Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

Modifications

Modifications to this device not approved by RDI Computer Corporation may void the authority granted to the user by the FCC to operate this equipment.

DOC Class B Notice

This digital apparatus does not exceed Class B limits for radio noise emission for a digital apparatus as set out in the Radio Interference Regulations of the Canadian Department of Communications.

Avis

Le present appareil numérique ne met pas de bruits radioe'lectnques depassant les limites applicables aux appareils numériques de la classe B prescrites dans le Reglement sur le brouillage radioélectrique edicte' par le ministere des Communications du Canada.

Safety Precautions

***WARNING**: Hazardous voltages are present inside the PrecisionBook workstation. To reduce the risk of electrical shock and/or personal injury, follow the operating and installation instructions carefully.*

***WARNING**: Do not attempt to recharge alkaline or other non-rechargeable batteries with the PrecisionBook workstation's AC adapter/charger. Alkaline batteries cannot be recharged. Attempting to recharge alkaline batteries may cause personal injury and/or damage to the PrecisionBook workstation.*

***WARNING**: To prevent fire, shock hazard, or damage to the equipment, do not expose the PrecisionBook workstation to rain or moisture. Do not immerse the PrecisionBook workstation in water. If water has entered the PrecisionBook workstation cabinet, do not use the workstation until it has been inspected by an authorized RDI service representative.*

***WARNING**: Do not dispose of PrecisionBook batteries in fire. Disposal of PrecisionBook batteries in fire may cause personal injury.*

***WARNING**: All service and upgrades to the PrecisionBook workstation must be performed by a trained technician only. Otherwise, you may encounter personal injury and/or damage your workstation.*

Mesures de Securite

***ATTENTION**: Il y a la presence des voltages hasardeux dedant l'ordinateur Precision Book. Pour reduire le risque de recevoir un choc electrique et/ou se blesser, il faut suivre soigneusement les instructions d'operation et d'installation.*

***ATTENTION**: Ne pas tenter de recharger les batteries alkalines ou les batteries nonrechargeables avec l'adapteur/chargeur AC de l'ordinateur Precision Book. Les batteries alkalines ne sont pas rechargeables, et d'essayer de recharger les batteries alkalines pourait resulter en blessure et/ou causer des degats a l'ordinateur Precision Book.*

***ATTENTION**: Pour eviter du feu, le risque de choc, ou des degats aux equipements, ne pas exposer l'ordinateur Precision Book a la pluie ou a l'humidite. Ne pas immerger l'ordinateur Precision Book dans l'eau. S'il y a de l'eau qui est penetree dans la boite de l'ordinateur Precision Book, n'utilisez pas l'ordinateur jusqu'a ce qu'il est inspecte par RDI.*

***ATTENTION**: Ne pas disposer au feu des batteries du Precision Book. Disposer des batteries du Precision Book au feu pourrait causer blessure.*

***ATTENTION**: Il faut que tous les services et des augmentations de qualite a l'ordinateur Precision Book soient executes par un technicien qualifie. Autrement, on pourrait se blesser et/ou il pourrait y avoir des dommages a l'ordinateur Precision Book.*

Sicherheitshinweise

***WARNUNG**: Beim Betrieb der PrecisionBook Workstation treten hohe Spannungen innerhalb des Gehäuses auf. Bitte befolgen Sie auf jeden Fall die Bedienungs- und Installationsanweisungen um jegliches Risiko einer Verletzung oder eines Personenschadens zu vermeiden.*

***WARNUNG**: Versuchen Sie auf keinen Fall, Ihre PrecisionBook Workstation mit Trockenbatterien (Primärzellen) zu betreiben oder solche mit dem Netz/Ladegerät zu laden. Versuche dieser Art können Personen-oder Sachschaden zur Folge haben.*

***WARNUNG**: Betreiben Sie Ihre PrecisionBook Workstation nicht bei feuchten oder nassen Umgebungsbedingungen. Falls Wasser oder Feuchtigkeit in das Gehäuse eingedrungen ist, sollten Sie Ihr Gerät vor Wiederinbetriebnahme von einem qualifizierten Servicetechniker überprüfen lassen.*

***WARNUNG**: Entsorgen Sie verbrauchte PrecisionBook Batterien nicht durch verbrennen. Es besteht Verletzungsgefahr, wenn PrecisionBook Batterien ins Feuer geworfen werden.*

***WARNUNG**: Alle Reparatur und Aufrüstungsarbeiten am PrecisionBook müssen von besonders geschultem Personal ausgeführt werden, andernfalls besteht Verletzungsgefahr und/ oder Ihre Workstation kann beschädigt werden.*

Important Safety Instructions

The following instructions pertain to the risk of fire, electric shock or bodily injury. Please read all of these instructions carefully.

1. Save these instructions for later use.
2. Follow all of the instructions and warnings marked on this workstation or included in this manual.
3. Do not use this workstation in unstable or unsupported conditions.
4. The workstation may fall, causing serious damage to the workstation and others around.
5. Slots and openings in the cabinet are for ventilation. To ensure reliable operation of the workstation, and to protect it from overheating, these openings must not be blocked or covered. Don't use this workstation on a bed, sofa, rug or other similar surface. This workstation should never be placed near an oven, a radiator, or heat register. This workstation should not be placed in a built-in installation unless proper ventilation is provided.
6. Never push objects of any kind into the workstation cabinet openings as they may touch dangerous voltage points or short out parts that could result in a fire or electrical shock. Keep liquids of any kind away from the workstation.
7. This workstation should only be connected to the AC power source indicated on your workstation system's information label. If you are not sure of the type of AC power available, consult your dealer or local power company. Only connect this workstation to a power outlet matching the power requirements of this workstation.
8. Do not allow anything to rest on the power cord. Do not locate this workstation where people will walk on the cord.
9. If you have to use an extension cord with this workstation, make sure that the total amperage rating of all equipment plugged into it does not exceed the amperage rating of the extension cord. Also, make sure that the total of all workstations plugged into the main AC power outlet does not exceed 15 amps.
10. Unplug your workstation from the main electrical power outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.
11. Do not use this workstation near water.

INFORMATIONS IMPORTANTES DE SECURITE

Les instructions suivantes se rapportent au risque du feu, du choc electrique, et de la blessure. Veuillez lire soigneusement tous ces instructions.

1. Garder ces instructions
2. Suivre tous les instructions et avis marques sur cet ordinateur ou notes dans ce manuel.
3. Ne pas utiliser cet ordinateur dans les conditions instables ou non soutenues.
4. L'ordinateur pourrait tomber, de cette facon causant du dommage serieux a l'ordinateur et aux autres presents.

5. Il y a des fentes et des ouvertures dans la boite de l'ordinateur pour la ventilation. Pour insurer l'operation fiable de l'ordinateur, et pour le protecter de surchauffer, il faut que ces ouvertures ne soient pas bloquees ou couvertes. Ne pas utiliser cet ordinateur sur un lit, un canape, un petit tapis ou autre surface comparable. Il faut jamais mettre l'ordinateur pres d'un four, d'un radiateur, ou d'un appareil de chauffage. Il faut pas mettre cet ordinateur dans une installation encastree a moins qu'on fournisse de la ventilation adequat.

6. Ne jamais mettre des objets dans les ouvertures de la boite de l'ordinateur parce qu'ils pourraint toucher des points de voltages dangereux ou court-circuiter certaines parties, resultant au feu ou au choc electrique. Garder que toujours il n'y a pas de liquides pres de l'ordinateur.

7. Il faut que cet ordinateur soit connecte uniquement a la source de courant AC qui est indiquee sur l'etiquette d'information de l'ordinateur. Si vous n' etes pas sure du type de la source de courant AC, il faut consulter avec votre fournisseur ou votre agence d'electricite. Connecter cet ordinateur uniquement a une prise de courant qui remplis les conditions d'electricite de cet ordinateur.

8. Ne rien laisser appuyer sur le cable electrique. Ne pas situer cet ordinateur ou on marchera sur le cable.

9. S' il faut utiliser un cable de prolongation avec cet ordinateur, il faut que l'amperage de tout ce qui est connecte au cable n'excede pas l'amperage du cable de prolongation. En plus, il faut que l'amperage totale de tous les ordinateurs connectes a la conduite maitresse AC n'excede pas 15 amperes.

10. Avant de nettoyer l'ordinateur, il faut le debrancher de la conduite maitresse. Ne pas utiliser des nettoyants liquides ou aerosols. Utiliser une toile humide pour nettoyer.

11. Ne pas utiliser cet ordinateur pres de l'eau.

Battery Warning Instruction

***CAUTION**: Danger of explosion if battery is incorrectly replaced. Replace only with the same or equipment type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.*

***ATTENTION**: Il y a danger d'explosion s'il y a remplacement incorrect de la batterie. Remplacer uniquement avec une batterie de meme type ou d'un type recommande par le constructeur. Mettre au rebutles batteries usagees conformement aux instructions du fablicant.*

***VORSICHT**: Explosionsgefahr bei unsachgemässem Austausch der Batterie. Ersatz nur durch denselben oder einen vom Hersteller empfohlenen ähnlichen Typ. Entsorgung gebrauchter Batterien nach Angaben des Herstellers.*

Wichtige Sicherheitsvorschriften. Unbedingt beachten.

Die nachfolgenden Anweisungen betreffen die Gefahr von Verletzungen durch elektrische Spannung, Feuer und mechanische Einwirkung. Bitte lesen sie diese Anweisungen sorgfältig.

1. Heben Sie diese Anweisungen für den späteren Gebrauch auf.

2. Beachten Sie alle Hinweise, die am Gerät selbst angebracht oder in den zugehörigen Handbüchern vermerkt sind.

3. Stellen Sie das Gerät an einem sicheren, stabilen Arbeitsplatz auf.

4. Die Workstation kann herunterfallen, was ernsthafte Verletzungen von Anwesenden oder starke Schäden am Gerät selbst verursachen kann.

5. Am Gerät angebrachte Öffnungen (Schlitze und sonstige Öffnungen) dienen der Belüftung des Gerätes. Um ein zuverlässiges Arbeiten des Gerätes zu gewährleisten und um Überhitzung zu vermeiden, müssen diese Öffnungen unbedingt freigehalten werden. Betreiben Sie das Gerät nie auf Betten, Sofas oder anderen, weichen Unterlagen.

6. Stecken Sie keine Gegegenstände (Schraubenzieher, Büroklammern, etc.) in die Öffnungen. Sie würden damit Kurzschlüsse herbeiführen, die zur Zerstörung des Gerätes führen, sich der Gefahr eines Stromschlages aussetzen oder das Gerät in Brand setzen.

7. Das Gerät darf nur an vorschriftsmässige Steckdosen mit der auf dem Gerät angegebenen Netzspannung angeschlossen werden. Wenn Sie nicht sicher sind, welche Netzspannung richtig ist, wenden Sie sich an den Lieferanten des Gerätes oder an das zuständige Elektrizitätswerk.. Bitte nur an genügend stark abgesicherte Steckdosen anschliessen, die der Leistungsaufnahme des Gerätes entsprechen.

8. Auf das Netzanschlusskabel dürfen keine Gegenstände gestellt werden.

9. Legen Sie das Netzkabel so, dass niemand darauftreten oder darüber stolpern kann.

10. Wenn Sie Verlängerungskabel benützen, müssen Sie sicher sein, dass die gesamte Leistungsaufnahme nicht grösser ist, als das Verlängerungskabel zulässt. Der gesamte Stromverbrauch aller angeschlossenen Geräte darf nicht mehr als 15A betragen.

11. Wenn Sie das Gerät reinigen, muss das Netzkabel aus der Steckdose gezogen werden.

Wartung der Workstation

Wenn Ihre Workstation nicht ordnungsgemäss arbeitet, dürfen Sie nur die Einstellungen vornehmen, die im Handbuch genannt werden. Andere Einstellungen oder Veränderungen können den Rechner beschädigen oder zerstören. Umfangreiche und kostspielige Reparaturen würden notwendig werden, um das Gerät wieder betriebsfähig zu machen.

Ziehen Sie den Netzstecker aus der Steckdose und verständigen Sie den zuständigen Kundendienst bei folgenden Störungen:

1. Netzkabel ist defekt oder stark abgenutzt.

2. Flüssigkeit ist in das Gerät gelangt.

3. Das Gerät war Regen oder Leitungswasser ausgesetzt.

4. Das Gerät ist heruntergefallen oder das Gerhäuse ist beschädigt.

5. Das Gerät arbeitet nicht mehr richtig.

Achtung!

Wenn Sie das Gerät öffnen müssen (Abnahme der verschraubten Haube), ist unbedingt folgendes zu beachten:

1. Das Netzkabel muss aus der Steckdose gezogen werden und zwar bevor Sie das Gerät öffnen.

2. Die Haube muss wieder montiert und verschraubt werden. Erst dann darf das Netzkabel wieder eingesteckt werden.

Warranty Policy
Terms and Conditions

RDI Computer Corporation (hereafter "RDI") warrants its products to perform in accordance with published specifications at the time of shipment. This warranty insures that all RDI products are free from defects in material and workmanship when used under the condition described below:

RDI's products, including the PrecisionBook, UltraBook, PowerScreen, PXU (Peripheral Expansion Unit), and MAX are designed for commercial use and not for use in "rugged" or harsh environments. Using the product in an environment considered by RDI as "non-commercial" and/or outside the environmental specifications, invalidates the product warranty. If in any doubt, contact RDI Customer Service at (800) 734-7030 or (760) 929-0992 for further clarification.

Warranty Period

Every RDI product is covered by a one year warranty starting from the original date of shipment from RDI. Extended warranties for additional years may be purchased as an option. (See Extended Warranty Program section)

Coverage and Limitations

If in RDI's opinion the product malfunctions at anytime during the stated warranty period, RDI will cover all defects in material and workmanship in the product. Coverage under this policy shall not include:

- Any product not distributed by RDI or an Authorized RDI dealer.
- Any product in which the serial number has been defaced, modified, or removed.
- Inspection and testing by RDI resulting in no defects found.
- Removal and maintenance of accessories, attachments, machines, or other devices (RDI and non-RDI) not covered by this agreement.
- Internal peripherals (i.e. hard disk) and options (i.e. memory) not supplied by RDI.
- Repair, maintenance and adjustment of RDI product required due to, but not limited to, neglect, misuse (including repair or maintenance by parties other than RDI or its authorized representatives), abuse, usage not in accordance with product specifications and instructions, accident, unauthorized alterations, repairs or modifications, damage caused by internal and/or external peripherals and options not supplied by RDI, improper environment (including lightning, static electricity, fire, or extreme temperatures), or acts of God.
- Service necessitated to comply with requirements of regulations of any Governmental body or agency arising after the date of purchase.
- Any software component of any product.
- Data recovery due to hard disk drive failure or motherboard failure .

Limitation of Implied Warranties

All implied warranties, including warranties of merchantability and fitness for a particular purpose, are limited in duration to the length of the specific product warranty. RDI, at its sole discretion, may replace the product in whole or in part with comparable equipment and may use re-manufactured and refurbished parts and modules in performing service. Replacement parts and modules shall become the end-user's property; the replaced parts shall become the property of RDI. RDI shall have no obligation to return replaced parts. In no event shall RDI be liable for any delay in rendering service under this warranty. RDI's maximum liability under this warranty shall be limited to the replacement portion of the product under dispute with comparable equipment.

Exclusion of Damages

RDI's liability for any defective product is limited to the repair or replacement of the product at its option. RDI shall have no liability or responsibility to the end-user or any other person or entity with respect to any liability for damage to other property, including software, caused by any defects in the product, damages based upon inconvenience, loss of use of the product, loss in time, loss of data, loss of business, commercial loss, or any other damages, whether incidental, consequential or otherwise. In no event shall RDI be liable for loss of profits or any indirect, special, or consequential damages arising out of any breach of this warranty policy. State laws vary the end-user's rights under this warranty policy.

Warranty Service

Products requiring repair must be shipped prepaid to a RDI repair facility. A Return Material Authorization (RMA) number must be issued by RDI Customer Service prior to any warranty return shipment. The product to be serviced must be accompanied by your assigned RMA number, dated proof of purchase, your name, address, and description of the problem as well as all interconnecting cables, cords, and supplements originally supplied with the product. All non-RDI equipment, accessories, attachments, modifications, programs, data and storage media must be removed from the product before it is delivered for service. RDI shall not be responsible for items that are not removed.

If you have any questions, or require an RMA number, please contact RDI Customer Service at: Phone: (800) 734-7030 or (760) 929-0992, Fax: (760) 931-5981 or Email: support@rdi.com.

Extended Warranty Program

RDI Computer Corporation offers extended warranties for the PrecisionBook, PowerScreen, PXU and MAX products for subsequent years after the initial one year warranty has expired. End-users are offered the option to purchase an extended warranty at time of purchase of their system or anytime thereafter. When an RDI product is under its original warranty, the end-user may purchase an extended warranty to commence from the date the original warranty expires. When the RDI product is beyond the original warranty period, end-users wishing to begin an extended warranty program must send the RDI system to the RDI Customer Service Department for a Serviceability Inspection (SI). The end-user will be responsible for all shipping charges. The inspection will be performed at no charge. Should a system not pass the SI, the customer will be contacted to authorize the repairs and will be invoiced at Time and Materials charges before commencing the extended warranty program.

Extended Warranty Period

RDI offers second and third year warranty options. The extended warranty covers repair and service charges for one or two 12-month periods from either the time of purchase of the extended warranty or the date the original warranty expires (where an end-user purchases the service contract at the time of system purchase or during the initial 12 month warranty period). The purchase of the second year warranty is required prior to the purchase of the third year extended warranty.

Placing Orders

Extended warranties may be purchased at the time the system order is placed, during the warranty period, or after the initial warranty expires. To place an order for an extended warranty, please fill out the Extended Warranty Order Form attached to this document and include your purchase order or check -made payable to RDI Computer Corporation. If you have any questions, please contact RDI Sales at (800) 734-5483 or Fax (760) 931-1063 or Customer Service at (800) 734-7030 or Fax to (760) 931-5981 or email: support@rdi.com.

Time and Materials Service

For end-users who do not choose the extended warranty option, RDI Customer Service provides time and materials repairs. The hourly labor rate is $125 per hour and a minimum two hour charge is assessed for any time and materials repairs. Charges thereafter are assessed at half-hour intervals. Time and materials repairs occur on a best effort basis. Turn-around time for time and materials repairs is based on material availability.

Notes

1 Introduction

The PrecisionBook series of portable workstations represent the most powerful and sophisticated portable computers available today. This hardware reference guide was developed to cover the capabilities of these high-performance machines and to ensure a long and productive computing life for the workstations. This manual covers the 132 and 180 series workstations, highlighting any differences in turn. It describes PrecisionBook's features, options, and maintenance. Also included is a detailed description of the PrecisionBook hardware.

This chapter introduces the PrecisionBook Hardware Reference Guide. Topics in this chapter include:

- Conventions used in this guide.
- Supplemental documentation.

Conventions in this Reference Guide

The following conventions are used in this reference guide.

Notes

Notes precede information that requires special attention.

Example:

Note: For your convenience, you can use your PrecisionBook on-board LCD or attach an external monitor.

Warnings and Cautions

Information of a hazardous nature is shown as indented text preceded by  .

Warnings are in italics to highlight conditions of potential personal injury. Cautions point out possible equipment damage.

Example:

Warning: *Disconnect all AC power and remove the battery prior to performing any cleaning and maintenance. Personal injury and equipment damage could result if a power source is connected to the PrecisionBook during cleaning or maintenance.*

Keyboard Input

Keyboard input appears in **boldfaced** type.

Screen Messages

Screen messages appear in Courier type within a box.

Example:

After the PrecisionBook passes its self-test, the following initial message appears:

```
Firmware Version x.x

Duplex Console IO Dependent Code (IODC) revision x

Memory Test/Initialization Completed

------------------------------------------------------------------------
(c) Copyright 1995-1998, Hewlett-Packard Company, All rights reserved
------------------------------------------------------------------------

Processor  Speed    State      Coprocessor State          Cache Size
---------  -----    -----      -----------------          ----------
x          xxxMHz   Active     Functional                 xxKB

Available memory (bytes):    xxxxxxxxx
Good memory required (bytes): xxxxxxxxx

Primary boot path:  SESCSI.x.x
Alternate boot path:SESCSI.x.x
Console path:       GRAPHICS(x)
Keyboard path:      PS2


System is 700 Series.
```

Variables

Variables appear as an italicized *x*. For example, the x's in the preceding screen are variables because the values shown will vary from system to system.

Supplemental Documentation

This Reference Guide is part of the PrecisionBook System Reference set provided by RDI for your convenience. Additional information can be found in the reference set.

For more information about the HP-UX operating system, refer to the HP-UX installation guides found in the PrecisionBook System Reference Set. For more information about the PrecisionBook than is contained in this user's guide, refer to the RDI Documentation CD that accompanies your PrecisionBook or contact your authorized PrecisionBook representative.

Notes

2 Detailed Hardware Description

This chapter provides a detailed description of the PrecisionBook hardware.

Physical Packaging

The PrecisionBook provides a slim, clamshell-style package, while maintaining full workstation capability. The PrecisionBook laptop weighs 7.5 pounds and has a footprint of 11.5 inches deep by 13 inches wide.

The keyboard is forward mounted in the base section of the PrecisionBook and the base section is sloped to provide a comfortable palm rest for wrist support during extended use. The center positioning of the 2.6 inches x 2.17 inches (66 mm x 55 mm) integrated touchpad allows right- or left-handed usage.

The hinged lid assembly allows 180 ° swivel for various viewing positions. The PrecisionBook may operate with the lid closed when an external monitor and keyboard are attached.

CPU Technology

The system motherboard is a dual-sided, 12.4-inch by 4.9-inch PCBA. This PCBA contains the processor complex, and several embedded I/O controllers. Dual-sided surface mount technology reduce physical requirements and improve reliability.

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

The processor complex supports the system processor and administers the GSC bus. Joining the bus to the system's PCI bus is the DINO chip.

A LASI chip connects the GSC bus to low-level I/O functionality, including the Ethernet media access layer.

The PHD-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.

An embedded SCSI controller provides all hard disk capability and access.

HP Compatibility

The 132 and 180 series PrecisionBooks use a PA-RISC-compatible motherboard, based on the HP B180L and B132L series processors and run at 132 MHz or 180 MHz, depending on your configuration. As a result, any hardware or peripheral device that is compatible with Hewlett-Packard HP B-series workstations is also fully compatible with the PrecisionBooks.

PrecisionBooks 132 and 180

The PrecisionBook 132 and 180 CPUs use the Hewlett-Packard HP B132Land B180L series processors operating at 132 or 180 MHz, respectively.

The HP PA-RISC processor chip houses both the IU and FPU functions, as well as first level caches. These caches contain 64 KB for data and 64 KB for instructions.

The processor interfaces directly with the memory subsystem and the PCI Bus.

At 132 MHz, the CPU delivers 6.49 SPECint 95 and 6.54 SPECfp 95 performance. At 180 MHz, the CPU delivers 9.92 SPECint 95 and 9.43 SPECfP performance.

Flash Memory

The PrecisionBook includes 1 MB of flash memory for use during system bootup.

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.

The PrecisionBook accepts 32 MB, 128 MB, and 256 MB expansion modules using the following 16 and 64 MBit DRAM configurations:

- l M x l6
- 4 M x 16

The PrecisionBook comes with a minimum memory configuration of 32 MB. System main memory is provided through plug-in expansion modules. Additional memory upgrades provide a maximum configuration of 512 MB.

Multiple versions of the main memory module are available, each providing a different amount of system memory (see Table 2-1). Memory modules are user-installable and can be used individually or in matched pairs.

Table 2-1. Memory Configurations

Valid Memory Configuration	Memory Modules Required
32 MB	1 x 32
64 MB	2 x 32
128 MB	1 x 128
256 MB	2 x 128 or 1 x 256
512 MB	2 x 256

Note: All installed memory must be installed as either individual memory modules or as matching and equivalent pairs. For example, to obtain 64 MB of main system memory, you must install two 32 MB memory modules that match each other in chip configuration and memory speed.

To obtain 32 MB of main system memory, you would install a single 32 MB memory module, leaving one memory connector slot unused.

Display Technology

The PrecisionBook series workstations support high resolution 1024 x 768 LCD panels. The PrecisionBook supports resolutions up to 1600 x 1280 using a compatible external monitor.

Display Controller

The standard PrecisionBook display controller is a GSC controller based on the HP Graffiti with a 4 MB frame buffer. This controller is a multi-functional and multi-resolution display. The display controller drives the internal display panel first and then provides output to an attached external monitor, supporting a maximum color density of 16 M colors or 256 shades of gray at 1024 x 768 pixels. The standard display controller supports a maximum refresh rate of 76 Hz.

The PrecisionBook comes standard with the HP VISUALIZE-EG graphics ASIC. HP VISUALIZE-EG provides high-speed graphics display with 8-bit double buffering and 8-bit overlay and supports up to 1600x1280 resolution display with HP color recovery technology.

Active Matrix Display

The PrecisionBook is configured with one of two high-resolution display panels, 14.1" XGA or 12.1" XGA.

- 14.1 inch 1024x768 active matrix color LCD. This display supports 16 M colors plus 256 shades of gray scale. It has a 60 Hz refresh rate.
- 12.1 inch 1024 x 768 active matrix color LCD. This display supports 16 M colors plus 256 shades of gray scale. It has a 60 Hz refresh rate.

All displays have a display response time of 80 ms. The displays also make use of two brightness push buttons to optimize display viewing. The brightness push button, **Bri-** and **Bri +** (**FN+F11, FN+F12**), are located on the PrecisionBook's keyboard. Both display panels use active matrix TFT technology. The LCD draws approximately 6 watts.

Note: As an added convenience, the PrecisionBook provides a VGA port on the back panel for attaching an external monitor, as shown in Figure 2-8.

External Monitor Support

Standard VGA monitors plug directly into the external video port on the PrecisionBook back panel, as shown in Figure 2-8.

If you have a different type of monitor, check your monitor manual and Appendix E for compatibility.

When using the internal LCD, an external XGA monitor can also be attached, allowing simultaneous LCD and monitor operation. If external system displays other than 1024 x 768 are used, the internal LCD will not operate during external monitor operation (it will be blanked).

Note: Simultaneous display is supported in 1024x768 mode for LCD projection panels and projectors.

The PrecisionBook supports the following external monitor standards:

- VGA (640x480)
- SVGA (800x600)
- XGA (1024x768)
- SXGA (1280x1024)
- Frame rates, 60 Hz, 72 Hz, 75 Hz

For more information on using external monitors, see Appendix E.

Status Liquid Crystal Display (LCD)

A single LCD panel below the main display shows current system status and activity. The status LCD indicator uses symbols to show the state of various system functions and conditions as described in Table 2-2.

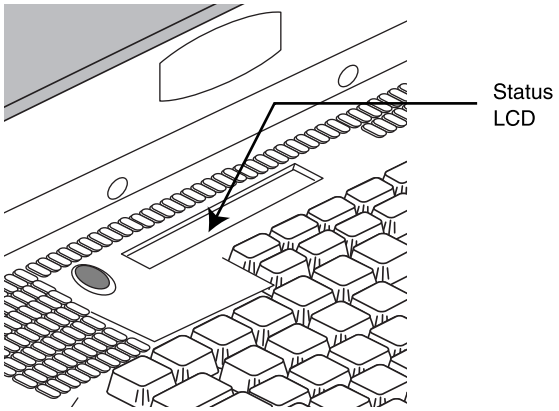


Figure 2-1 Status LCD

The Status LCD provides a running status on the following items and conditions:

- Hard disk
- Floppy disk
- CD-ROM
- Network
- External Monitor
- Caps Lock
- Sroll Lock
- Battery
- AC cord
- Power Button
- Over temperature indicator
- Heartbeat
- Audio Mute

Table 2-2. Status LCD Symbols

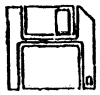
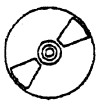
Symbol	Condition
	Hard disk The hard disk activity symbol displays during hard disk use, e.g., during read/write operations and other conditions where hard disk activity is required.
	Floppy disk The floppy disk activity symbol displays during floppy disk use, e.g., during read/write operations and other conditions where floppy disk activity is required.
	Internal CD-ROM (PEM Only) The CD-ROM activity symbol displays during compact disk use, e.g., during disk read operations and other conditions where compact disk activity is required. ***Note:*** The CD-ROM activity symbol only displays when a CD-ROM internal to the system's Periperal Expansion Module(PEM) is in use. This symbol will not display when a CD-ROM is attached to the system using its external SCSI port.
	Network The network activity symbol displays during network use. This symbol continues to display as long as you are connected to a networked environment.
	External Monitor The external monitor symbol displays after you have connected the workstation to an external monitor or other display device, e.g., LCD projection panel. This symbol continues to display as long as you are connected to an external display device.

Table 2-2. Status LCD Symbols

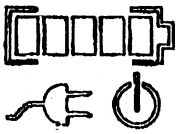
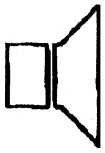
Symbol	Condition
	Key Lock Status This symbol displays after you press the Caps Lock key on the keyboard. It continues to display until the key is pressed again and released.  This symbol displays after you press the Shift Lock key on the keyboard. It continues to display until the key is pressed again and released.
	Power Status  This symbol appears during normal battery use and operating conditions. During normal battery use, the battery symbol displays percentage of available capacity in percentile segments of 20% each. It continues to display as long as battery power is in use or until the current battery process terminates. When the battery is charging, the outer edges of the symbol blink to indicate a charging state. When the battery is undergoing calibration (necessary for accurate battery readings), both the inner and outer edges of the battery symbol blink to indicate a calibrating state.  This symbol appears when AC power is in use, e.g., when using the workstation's AC adapter.  This symbol appears after you push the power button to turn on the workstation. It continues to display until the power button is pressed again to turn off the workstation.
	Economy Mode This symbol appears during economy mode operation. It continues to display until the workstation shifts out of an established power conservation mode or routine.

Table 2-2. Status LCD Symbols

Symbol	Condition
	Over Temperature This symbol appears during two operating conditions, over temperature and critical high temperature. When the operating temperature is outside of acceptable parameters, the symbol displays and flashes to warn you of this condition. If the temperature continues to exceed acceptable parameters, the over temperature symbol turns a solid color and the workstation shutsdown.  Warning: *If you allow the PrecisionBook to reach a state of critical high temperature, the unit may sustain damage*
	Heartbeat The heartbeat symbol displays during HP-UX activities. This symbol continues to display until HP-UX activities pause or are stopped.
	Audio Active This symbol displays when the workstation audio functions are active. This symbol continues to display unless and until the workstation audio functions are turned off or muted using the keyboard Mute key.

Input-Output Devices

Input-output devices are supported through device bays and access panels. The PrecisionBook has three device bays and three access panels. Device bays are cavities in the unit into which you can install modular devices such as a hard disk drive or a single lithium-ion battery. Two device bays are located on the left side of the unit and are reserved for hard disk drive modules. The third device bay is located on the right side of the unit and is configured at the factory to accept either a lithium-ion battery module or a hard disk drive. Empty device modules are available for empty or unused device bays.

Access panels consist of ports, connectors, and switches hidden behind three fold-down panel doors. Two access panels are located along the right side of the unit. The third access panel is located to the rear of the unit. Audio devices are supported through a series of input and output jacks located directly above the third device bay.

The PrecisionBook accepts the following removable device modules:

- Removable hard disk drives
- Lithium-ion battery module

Hard Disk Storage

The PrecisionBook uses low-profile, high-performance, 2.5-inch removable hard drive modules with an integrated SCSI controller. These drives require a 5V input and dissipate approximately 2 Watts of power.

Note: If the PrecisionBook is configured at the factory to support a hard disk drive in the third device bay, this hard disk drive replaces the unit's removable battery module and you cannot use battery power.

Note: Of the two left-side device bays, the device bay closest to the rear of the workstation is reserved for the system's primary boot device. If you have only one hard disk, install it in this slot.

External Floppy (Optional)

The PrecisionBook supports an optional 3.5-inch 1.44 MB external floppy disk drive via a standard 15-pin floppy drive connector. The external floppy drive provides media ejection via a manual push button.

The floppy drive supports 1.44 MB, Double-Sided, High-Density (DSHD) diskettes.

The floppy drive connector is located beneath the PCMCIA slot, as shown in Figure 2-9. The external floppy is powered by the unit through the 15-pin floppy drive connector.

PCMCIA (PC Card)

The PrecisionBook has two PCMCIA slots, as shown in Figure 2-9. The PCMCIA slots are located above the external floppy drive connector, on the right side of the workstation. The workstation supports two Type I or Type II cards or one Type III card.

Note: Always refer to the PCMCIA device manual for information about the device you are using.

Keyboard and Touchpad

The PrecisionBook's 97-key keyboard (as shown in Figure 2-2) provides all the functions of a US PS/2 keyboard and includes 12 function keys. The PrecisionBook's keys are full-sized and full-travel. The PrecisionBook also provides an integrated touchpad for operations that require a pointing device.

Internal Keyboard

A full-sized, 97-key keyboard is standard with each PrecisionBook, see Figure 2-3. The keyboard includes an integrated three-button touchpad for applications that require a pointing device. The dual-ported keyboard controller supports simultaneous external and internal keyboard operation.

The PrecisionBook provides a round DIN-6 connector to accommodate PS/2 type external keyboards, domestic or international as shown in Figure 2-8.

If you connect a keyboard to the PrecisionBook's external keyboard connector, the on-board keyboard is unaffected. You can then use either keyboard for your typing activities.

When you remove the external keyboard, the on-board keyboard continues to function.

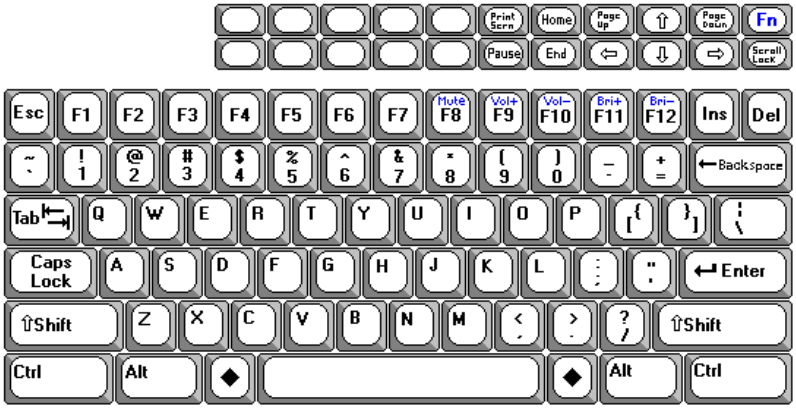


Figure 2-2 PrecisionBook Keyboard Layout

Touchpad

An integrated micro touchpad facilitates mouseless operation. The touchpad is 2.6 inches x 2.17 inches (66 x 50 mm in size), has three buttons, and is pixel-accurate. The touchpad is not disabled when an external mouse is connected to the PrecisionBook.

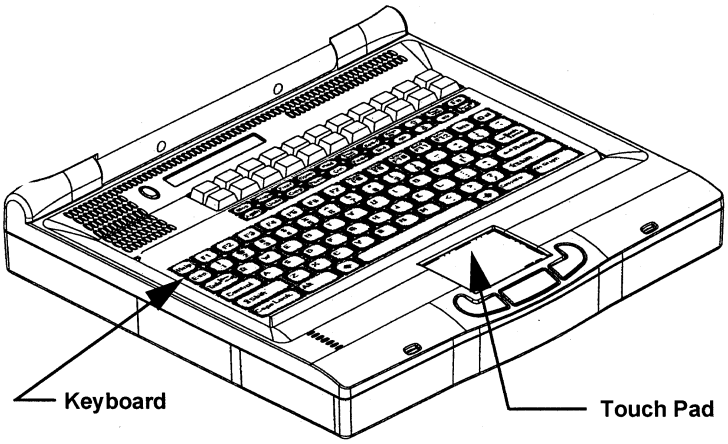


Figure 2-3 Keyboard and Pointing Device

To use the touchpad:

- Move the cursor by lightly dragging your finger over the touchpad surface
- Click on an item by tapping the touchpad surface once
- Double-click on an item by tapping the touchpad twice
- Drag an item, draw, or highlight by tapping the touchpad twice and holding your finger down while you drag it over the touchpad surface

You can also use the touchpad buttons to click and drag, just as you would those on an ordinary mouse.

External Keyboard or Mouse

The PrecisionBook provides two round DIN-6 connectors to accommodate an external keyboard and mouse as shown in Figure 2-8. You can connect an external PS/2 type keyboard when the PrecisionBook is turned on or off.

If you connect an external keyboard to the PrecisionBook's external keyboard connector, the on-board keyboard is unaffected. You can then use either keyboard for your typing activities. When you remove the external keyboard, the on-board keyboard continues to function.

Separately, you can connect an external mouse to the DIN-6 mouse connector. An external mouse or other pointing device will not disable the on-board touchpad.

Onboard Audio

The PrecisionBook provides a variety of onboard audio services and connectors, including:

- Audio and microphone jacks
- Internal speaker

The right-side panel contains audio input and output jacks for connecting an external audio devices, as shown in Figure 2-9 and Figure 2-4. Audio input and output jacks are standard 1/8” stereo jacks.

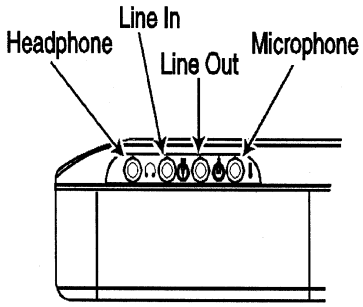


Figure 2-4 Onboard Audio

The PrecisionBook provides the following audio functionality:

- Headphones
- Line In
- Line Out
- Microphone
- Internal speaker

Headphones

The headphones jack allows you to connect stereophonic headphones for private listening of audio output.

Line In

The Line In jack allows you to connect the system to external stereo signals and other audio sources, e.g., compact disk or audio tape players.

Line Out

The Line Out jack allows you to connect the system audio output to external stereophonic devices, e.g., external amplifiers or amplified speakers. The Line Out jack provides 16-bit 48 kHz stereo output signals.

Microphone

The microphone jack allows you to connect a Dynamic, Electret, or other PC-compatible external microphones to the system.

Internal Speaker

The PrecisionBook includes a built-in audio speaker which reproduces monophonic sound generated by application programs. Volume is adjusted using the **Vol+, Vol-,** and **Mute** function keys on the integral keyboard.

External Connections

This section describes the PrecisionBook's available external connections. For information on external devices, see Input-Output Devices earlier in this guide.

The access ports support a wide variety of input-output options, including:

- Ethernet
- Serial/Parallel
- Fast SCSI-II
- Video
- Docking
- DC power

Ethernet

The PrecisionBook rear panel provides a built-in twisted pair (10-Base T) Ethernet network port as shown in Figure 2-8. This industry-standard RJ-45 telephone-type connector allows connection to twisted pair Ethernet networks. A twisted-pair Ethernet cable is similar in appearance to a modular telephone cord.

Serial, Parallel, and AUI

The PrecisionBook back panel provides two serial ports, an AUI port, and one enhanced parallel port integrated into a single 50-pin connector on the back panel. These ports are accessed through the I/O break-out cable supplied with the PrecisionBook, providing two DB-9 serial connectors, one DB-25 Centronics-compatible parallel connector, and one DB-15 AUI connector (shown in Figure 2-5). Use these connectors for attaching industry-standard parallel and serial devices.

Each serial port supports asynchronous and synchronous communications at speeds from 300 to 115,000 bps. Each port supports a complete set of EIA RS-232C modem signals.

The illustration below shows the standard I/O break-out cable connections:

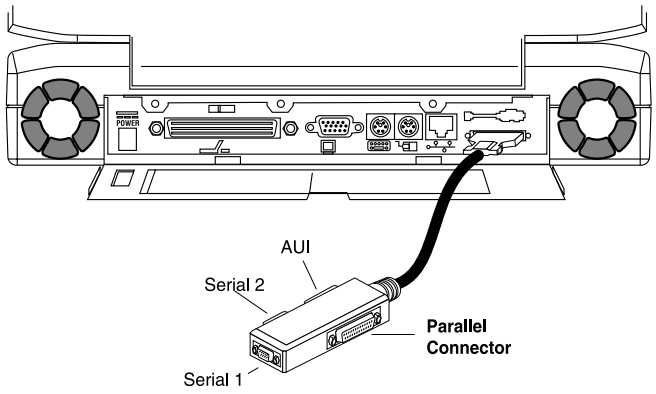


Figure 2-5 Break-Out Cable Connections

Fast SCSI-II

A Fast SCSI-II interface is provided at the right-side access port (as shown in Figure 2-9) for attaching external SCSI devices. This supports connecting external disk drives, CD-ROMs, etc. Transfer rates are 10 MBps in synchronous and 5 MBps for asynchronous operation.

The supplied SCSI connector Figure 2-9 is a 50-pin subminiature D-type female connector. Up to seven SCSI devices (including internal hard drives), can be connected to the PrecisionBook simultaneously.

Follow the manufacturer's instructions carefully when connecting external SCSI devices to the system, especially when setting unique SCSI device addresses and terminating the SCSI bus after the last installed device.

Termination

External devices can have a maximum SCSI bus length of 2 meters and must use active termination installed at the last device on the external bus.

External SCSI Connections

When using external SCSI devices with your PrecisionBook, an active terminator with the appropriate connector is required.

For more information about SCSI cabling options, termination, and availability contact RDI Customer Service at 1-800-734-7030.

Video

The PrecisionBook supports standard monitors with VGA connectors. For more information on external display capabilities, see External Monitor Support in Chapter 2.

Docking Module

The PrecisionBook includes an onboard docking connector for docking the workstation. Docking modules may contain additional peripheral, input-output, display, and battery options. Contact your authorized RDI distributor for more information about docking options.

DC Power

The PrecisionBook receives 18 VDC of continuous power at a maximum of 70 watts using the supplied AC adapter. Additionally, the PrecisionBook may receive 11.1 VDC nominal from an onboard battery module with a rated capacity of 45 watt hours when not tethered using the AC adapter. For more information on the DC power requirements of the PrecisionBook, see Battery Technology later in this guide.

Power Supply

The PrecisionBook gets power from the internal battery module or by connecting the external AC power adapter/charger.

AC Adapter

The adapter operates from 90 - 264 VAC. The adapter is a switcher-type power supply operating at a nominal frequency of 75 kHz. It provides DC power input for running the system. The adapter provides 18 volts DC to the main system. The PrecisionBook supports full desktop functionality when tethered to the AC adapter. The AC adapter also supports simultaneous workstation usability and battery charging.

Battery charge management follows a constant-current, constant-voltage (CCCV) scheme, with a charge-time cutoff. A maximum absolute temperature shutoff ensures that the maximum charge is provided to the battery, but does not reach temperatures high enough to cause damage or limit lifetime.

Battery Technology

The PrecisionBook uses a lithium-ion battery module to power the workstation when AC power is not available. The lithium-ion battery module has a gravimetric power density 100% higher than NiMH or NiCd batteries and

suffers no memory effect from the recharge cycle. The battery device bay is located at the front-right side of the workstation below the onboard audio input/output jacks, as shown in Figure 2-4.

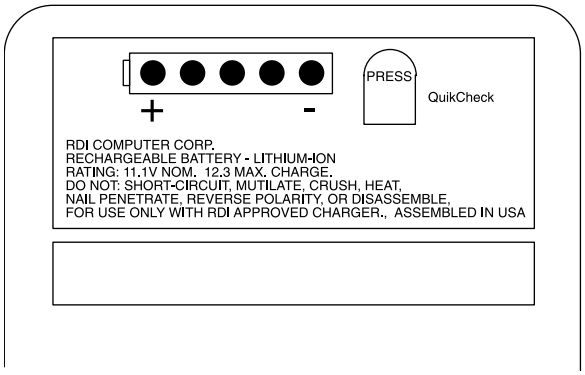


Figure 2-6 Lithium-Ion Battery Module

The 4050 mAH battery module provides one hour of continuous-use battery operation, depending on system configuration. The battery module has nine cells, supplying 11.1 volts nominal to the internal DC power converter and contains a Benchmarq bq2050 Gas Gauge (GG) chip to learn the maximum effective capacity of the battery pack.

The battery module contains a five element LED power gage allowing you to check the charge status of the battery module before installing it in the PrecisionBook. The power gauge displays remaining capacity in increments of 20%.

As battery power decreases, the workstation monitors performance and warns you of low battery power. You should then save your work before the battery charge is exhausted. Battery life updates continue as long as the low-battery condition exists.

During a low-battery condition, switch to AC power or halt the PrecisionBook and powerdown. Continued battery use will eventually lead to an automatic shutdown. Refer to the Hardware User's Guide for information about halting and powering-down the PrecisionBook.

Note: If you switch to AC power instead of halting and powering down the PrecisionBook, you can remove and replace battery modules while the system is connected to AC power.

Caution: Follow the proper shut down procedures described in Chapter 3 of the PrecisionBook Hardware User's Guide to halt and powerdown the PrecisionBook. Otherwise, you may corrupt important system files on your workstation.

Warning: *Never use nickel cadmium or nickel metal hydride batteries with the PrecisionBook or try to recharge such batteries with the AC adapter. Use only the lithium-ion battery module supplied with the PrecisionBook.*

WARNUNG: *Ihre PrecisionBook Workstation wird mit einer aufladbaren Lithium Ionen Batterie geliefert. Versuchen Sie auf keinen Fall, Ihre PrecisionBook Workstation mit Trockenbatterien (Primärzellen), Nickel Kadmium- oder Nickel Metall Hydrid Akkus zu betreiben oder solche mit dem Netz/Ladegerät zu laden.*

Note: For information on installing the battery module, refer to PrecisionBook Hardware User's Guide.

Battery Recharging

You can use the AC adapter to recharge the battery module. The battery module recharges automatically when the battery module is installed and the workstation is connected to its AC adapter. It takes approximately 3 hours to recharge the battery module

with the workstation powered off. When powered up, the workstation dynamically calculates the difference between the AC adapter capacity and the power required to operate the workstation. Any remaining capacity is automatically applied to background charging.

Note: Background charging may require more than three hours to fully recharge the battery module, depending on battery condition and workstation power requirements.

The battery module can be discharged and recharged from 500 to 1,000 times before it needs replacing. When you need to replace the battery module, obtain a replacement battery module from your authorized RDI representative.

The battery charger circuit has two modes of operation, fast and background charge. Fast charge is enabled when the external AC power adapter/charger is connected and the system is powered off. Fast charge provides a full recharge of the batteries within 3 hours.

For information on installing the battery module, refer to the Hardware User's Guide.

Device Bays and Access Port Locations

This section shows you where to connect external devices to the PrecisionBook and where to install modular components. You can make connections to the PrecisionBook at the rear and right-side access ports, or through the unit's audio input and output jacks. Open the rear or right-side access panels as applicable to use

the PrecisionBooks access ports. To install modular components, insert the component in the appropriate device bay or see the PrecisionBook Hardware User's Guide for more information.

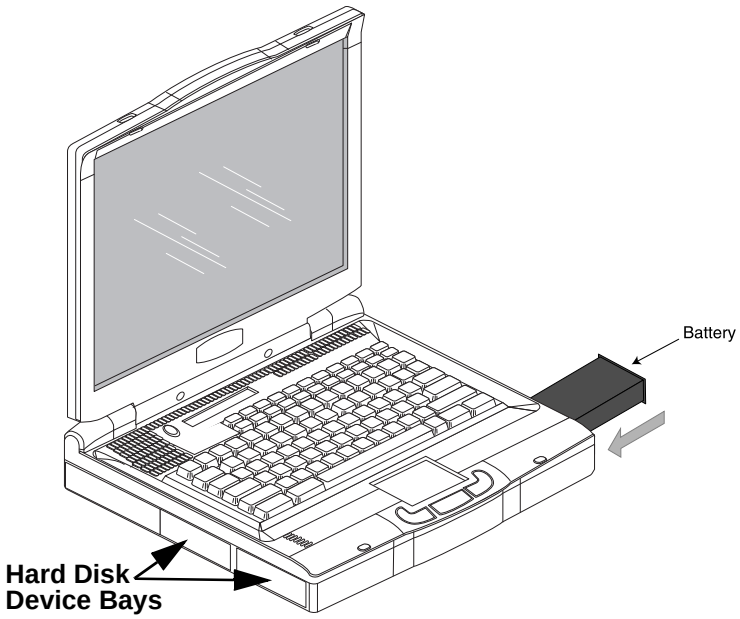


Figure 2-7 PrecisionBook Device Bays

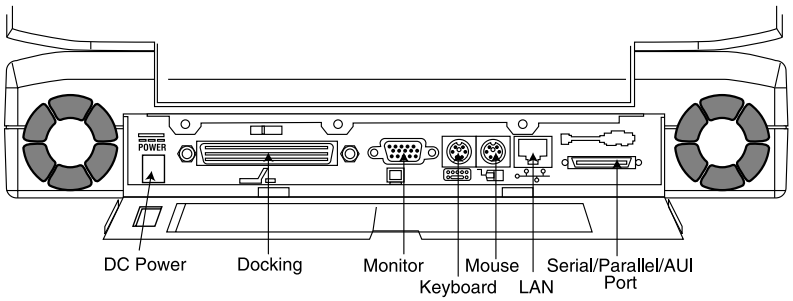


Figure 2-8 PrecisionBook Rear Access Ports

Note: Appendix B contains a list of the connector pin assignments.

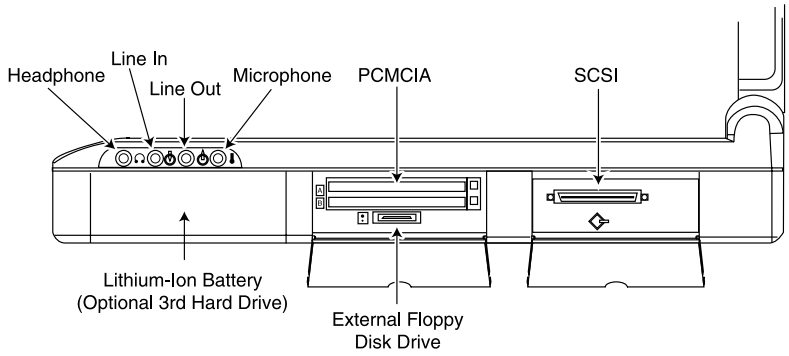


Figure 2-9 PrecisionBook Right-Side Access Ports

Options

The following sections describe the options available for the PrecisionBook workstations.

Languages

Standard C, C++, FORTRAN, ADA, and a wide selection of other languages are available from Hewlett-Packard or third parties for use with the PrecisionBook.

Sources

PrecisionBook replacement parts and options are available from your authorized PrecisionBook dealer. Contact your local dealer or RDI for a listing of the dealers in your area.

The following items are available from your PrecisionBook representative:

- AC adapter
- Rechargeable battery pack
- Nylon carrying case
- Hard carrying case
- Deluxe soft carrying case
- HP-UX 10.2 operating systems
- 56.6 kbps PCMCIA modem card
- User-installable hard disk modules
- User-installable memory modules
- Three-button mouse
- Additional manuals

The following items are available from Hewlett-Packard dealers:

- HP-UX operating systems on CD-ROM or cartridge tape
- Three-button mouse
- High-performance color, monochrome, and grayscale video monitors
- Laser printers
- Serial port cables
- Answer Book CDs

The following items are available from third-party suppliers:

- Ethernet transceiver cables
- Three-button mouse
- High-performance color, monochrome, and grayscale video monitors
- Video monitor cables
- External SCSI devices (hard disk drives, CD-ROMs, cartridge tape drives, etc.)
- Laser printers
- External modems
- Serial port cables
- Audio input/output devices (amplifiers, microphones, etc.)
- PCMCIA cards (modems, flash memory, disk drives, etc.)

Note: Contact your authorized PrecisionBook representative for a complete listing of supported PCMCIA devices.

3 Maintenance

Maintaining the PrecisionBook properly protects your investment. This chapter provides information for cleaning, packing, and storing the workstation, and battery maintenance.

Warning: *Any service and upgrades to the PrecisionBook which require opening and removing the unit's case must be performed by a trained technician only. Otherwise, you may encounter personal injury, damage the PrecisionBook, and void your warranty.*

WARNUNG: *Das Öffnen des Gehäuses zum Zwecke der Reparatur oder zum Wechseln/ Hinzufügen von Modulen darf nur von einem qualifizierten Servicetechniker durchgeführt werden. Es besteht Gefahr durch Elektroschock. Durch unsachgemässe Behandlung kann ihre PrecisionBook Workstation beschädigt werden, ausserdem erlischt dadurch die Garantie.*

Caution: *Changes or modifications to the PrecisionBook not expressly approved by RDI could void your authority to operate PrecisionBook.*

If the product does not operate normally, adjust only those controls that are covered by the operating instructions. Unplug the PrecisionBook from the power outlet and call customer service under any of the following conditions:

- If the power cord or plug is damaged or frayed.
- If liquid has been spilled into the workstation or it has been exposed to rain or water.

- If the workstation has been dropped or the case has been damaged.
- If the workstation exhibits a distinct change in performance for the worst.

Stop! *After your warranty period, if you ever have to remove the main system unit cover, observe the following precautions:*

The power supply cord must be unplugged before the main system unit cover is removed. (Separe le cordon d'alimentation et puls enleve le couverde.)

Once removed, the cover must be replaced and screwed in position before the power supply is plugged back in. (Apres le couverde a encleve, visse le couverde en place et remettre le cordon d'alimentation.)

Cleaning The PrecisionBook

As a portable workstation, the PrecisionBook may collect dust and dirt, requiring occasional cleaning.

To clean the PrecisionBook:

1. Halt and power-down the system.

   Refer to the User's Guide, Chapter 3.

2. Unplug the AC adapter/charger before cleaning.

3. Once the PrecisionBook is turned off, you may clean the cases and key tops with a soft cloth damp with mild soap and water only.

Caution: Never use any water or water-based products on the display panel. Use only a dry, soft cloth. Screen damage could result.

4. Avoid getting any liquid directly on the PrecisionBook. Moisten a lint-free cloth with cleaner and use the damp cloth to clean the case.

5. Use cotton-tipped swabs, moistened with cleaner, to clean key tops, slots, and recesses. Do not use liquid cleaner on connectors or metal contacts. Use only a commercial contact cleaning spray on such parts.

Caution:Never use flammable or organic cleaning solvents or abrasive cleaners to clean the PrecisionBook. Such cleaners will damage the case's finish.

6. Use a commercial floppy disk drive cleaning kit to clean the floppy disk drive. Follow the kit manufacturer's instructions carefully.

7. Do not use liquid cleaners on the interior of the PrecisionBook. Accumulated dust may be blown out of the interior using dry, low-pressure compressed air. Always wear eye protection when using compressed air to blow out dust.

Packing and Shipping

To pack the PrecisionBook for shipment:

1. Disconnect all cables from connectors on the PrecisionBook rear panel. Do not pack the PrecisionBook with cables still attached to connectors.

2. Verify the battery compartment and connector panel on the back of the PrecisionBook are closed.

3. Close and lock the display cover.

4. Pack the PrecisionBook in the **original** shipping container. Follow the instructions printed on the container for proper packing order and configuration.

Caution: Damage caused by shipping the PrecisionBook workstation in containers other than the original shipping container is **NOT COVERED BY THE WARRANTY. KEEP AND USE THE ORIGINAL SHIPPING CONTAINER**.

Note: If the original materials are unavailable, contact RDI customer service for a new container. The original shipping containers are specifically designed for the PrecisionBook workstation.

5. Ship with any commercial carrier.

Storage

If you intend to store the PrecisionBook longer than 60 days:

1. Make a complete backup copy of the contents of the hard disk(s).

2. Fully discharge and remove the battery pack (see Battery Pack Maintenance). Do not store the PrecisionBook for extended periods with the battery pack installed.

3. Disconnect all cables and pack the PrecisionBook as described in Packing and Shipping earlier in this guide.

When you want to start using the PrecisionBook again:

1. Give the PrecisionBook enough time to stabilize at room temperature before operating. This is particularly important when the workstation is brought from a very cold environment into a warm room. In such cases, moisture can condense on and inside the

workstation and can cause problems. Allow at least two hours for the workstation temperature to stabilize after bringing it from a very cold or very warm environment before proceeding.

2. Reinstall the battery pack and charge it for three hours without operating the PrecisionBook before attempting to operate the PrecisionBook on battery power.

Low Battery Shutdown

The PrecisionBook's battery is uniquely designed to provide the longest possible duration. As with any battery, however, prolonged use will require the battery to be recharged. Typically, battery power lasts up to 1 hour, depending on the type and number of processes you are performing.

To prolong battery use, use the brightness push-buttons (**F-11** and **F-12**) on the integral keyboard to reduce the brightness of, and the power consumption by, the LCD.

As battery power decreases, the PrecisionBook performs a sequence of events, described in Table 3-1. During this sequence, the PrecisionBook provides constant messages and an audible alarm informing you of the battery's current status. If you have CDE running, the PowerTool also appears, which displays the current battery voltage. If you desire, you can use the PowerTool to turn off the alarm.

Note: The Duration column in Table 3-1 reflects approximate times during typical operating activities and conditions.

Table 3-1 PrecisionBook Low Battery Shutdown

Battery Status	Duration (Estimated)	System Actions	Actions You can Perform
Fully charged	Up to 1 hour	None	None required
Low battery condition	10 - 15	Warning message displayed on the Console. Audible warning sounds. If CDE is running, PowerTool window pops up, displaying battery capacity.	Attach AC adapter, or save and begin exiting processes. To complete jobs currently running, use dimmer switch to lower the LCD intensity and save battery power. Use the PowerTool to turn off the alarm, if desired.
Critical battery condition	2 minutes	Power management daemon starts system shutdown sequence. When the shutdown sequence completes, the system displays a message indicating that it is ok to turn off power to the system.	HP-UX shutdown cannot be interrupted. Attaching AC adapter will still require you to boot the PrecisionBook after the shutdown. Connect the AC adapter card and reboot the PrecisionBook. Press the power switch to turn off the system. Leave the system in this state until battery power is exhausted, causing automatic power shutdown.

Battery Pack Maintenance

When operating the PrecisionBook from battery power, pay particular attention to:

1. Low battery warning - when the battery reaches the end of its charge, a “battery low” message appears a beeping alarm sounds, and a PowerTool window appears if CDE is running. These indications mean you have approximately 15 minutes to complete your work before the battery charge is exhausted.

2. When this occurs, follow the proper power-down procedure to quickly halt and power-down the PrecisionBook, or connect the AC adapter to maintain system operation. The PrecisionBook will continue to remind you about the low battery status if you continue to use battery power.

Refer to the Hardware User's Guide, Chapter 3, Halting the Operating System to bring the PrecisionBook to a halt.

WARNING: *DO NOT allow the batteries to fully discharge while operating the PrecisionBook from battery power, because this may corrupt your workstation files.*

WARNUNG: *Vermeiden Sie auf ieden Fall eine Entladung des Akkus unter die Abschaltschwelle Ihrer PrecisionBook Workstation, da durch ungewolltes Abschalten Daten verlorengehen, oder verändert werden können.*

- The PrecisionBook lithium-ion batteries will attain their optimal charge capacity after about five complete cycles. Do not be alarmed if during the early cycles, the batteries only run 80% to 90% before requiring recharge; this is normal. After about five cycles, the batteries should easily run for a normal time span.

- If the batteries have been set aside unconnected for a period of time, you may notice that during the first cycle after their re-connection and use, their performance has dropped off slightly by 10 to 20%; this is normal in lithium-ion batteries which have been recently dormant. Complete one full discharge-recharge cycle and the batteries will regain the optimal charge levels.
- Swapping battery packs - one way to obtain maximum use out of the PrecisionBook's portability is to pre-charge one or more rechargeable battery packs before operating the workstation from battery power. For example, you may purchase additional battery packs, charge them, and carry them with you into the field. As each battery pack becomes discharged, bring the PrecisionBook to a halt, then remove the discharged pack and replace it with one that is fully charged.

Refer to the Hardware User's Guide for more information on halting and powering down the PrecisionBook.

Note: If you shut down the PrecisionBook to swap batteries, you must follow proper shutdown procedures, otherwise, important system files may corrupt.

- Replacing battery packs - when lithium-ion batteries reach the end of their service life, they indicate their impending failure by providing shorter and shorter intervals of service between recharging and finally by failing to hold a charge. When this occurs, you must replace the worn out battery pack with a new one. Replacement battery packs can be ordered from your PrecisionBook representative.

Caution: Worn battery packs should be discarded in accordance with the disposal requirements for your area.

Gas Gauge Calibration (Battery Pack)

The Benchmarq bq2050 Gas Gauge (GG) chip used in the PrecisionBook battery pack requires periodic calibration to learn the battery's maximum effective capacity.

The calibration process forces the gas gauge chip to re-learn the maximum capacity of the battery pack by completing a cycle of full charge, full discharge, and full re-charge. The gas gauge chip requires calibration after about 64 cycles of full charge and/or discharge of a battery.

The Battery Management window of the PowerTool will indicate if a battery (i.e., its gas gauge chip) requires calibration. See Chapter 4, Power Management for more information.

Notes

4 Power Management

Understanding the PowerTool

The PrecisionBook PowerTool allows you to control the power management behavior of your system. The main program dialog provides an overview of critical power management areas, including available battery capacity, estimated battery time remaining, current processor speed, and LCD status.

Figure 4-1 shows the main PowerTool dialog.

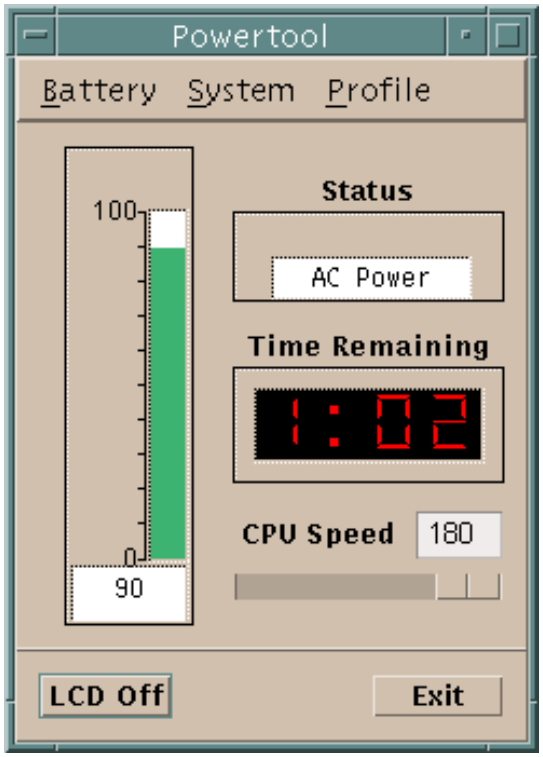


Figure 4-1 PowerTool GUI

The PowerTool is installed as **/etc/pm/powertool** when you install the power management utility.

By default, the PowerTool is configured to pop up automatically when the low battery condition configured in /etc/pm/pm.cf is reached. However, you can run the PowerTool any time under CDE by executing the command **/etc/pm/powertool.**

Note: Non-privileged users need to execute the command **xhost +** after CDE has started for the PowerTool to pop up automatically during low battery conditions. This command grants other utilities (such as the PowerTool) access to the screen. Refer to the xhost(1) man page for more information.

Caution: If power to the PrecisionBook is suddenly turned off and there is no available battery power, the unit's power management features will not be able to perform a graceful shutdown, which may damage important system files.

PowerTool Fields

The main PowerTool dialog, shown in Figure 4-1, provides access to all PowerTool power management features. The system displays this dialog if you invoke the PowerTool under CDE or if the system reaches a low-power condition.

This dialog includes the following power management features:

- Fuel Gauge
- Status
- Time Remaining
- CPU Speed
- LCD Off

Fuel Gauge gauge

Capacity shows remaining battery power available to the system. If more than one battery is installed (optional docking module required), capacity displays in cumulative increments of 100%. For example, if two batteries are installed, the maximum available capacity is 200%. This field is for reference only.

Status

Status displays the current status of the system, **AC Power**, **Battery**, **Calibration**, or **Failure**. This field is for reference only.

Time Remaining

Time Remaining displays the estimated battery time available to the system. The system estimates time remaining in minutes. This field is for reference only.

Note: If the system is on AC and a battery is present, then the time remaining is an estimation of how much time the system would have if it switched to battery at the current capacity. This estimation is based on the last time the system was used with the battery.

CPU Speed

CPU Speed displays the current processor speed. Using the CPU Speed slider, you can adjust the current processing speed of the system. You can adjust the current processing speed by moving the slider until the desired CPU speed displays. Move this slider to adjust power consumption levels by adjusting the processing power in use.

Note: CPU speed adjustment is not currently supported in this release of the PrecisionBook.

LCD Off

Pressing LCD Off blanks (turns off) the main LCD display panel. Press this button to reduce power consumption by turning off the main LCD display panel during critical computations. Press the left mouse button of your pointing device to turn the LCD display panel back on.

Note: The LCD display panel will not power up again until user input is detected from the left mouse button of your pointing device. Normal keyboard and mouse movement *will not* power up the display panel. This functionality is designed to conserve critical computational resources where screen display is not immediately required.

Exit

Pressing Exit allows you to quit or halt the PowerTool dialog.

After installing a new battery pack, use the AC adapter to recharge the battery pack. It takes about 2.5 hours to recharge a new battery when the PrecisionBook is turned off. After fully charging the battery pack, you can operate the PrecisionBook for about for about one hour with a single battery, depending on your configuration and applications.

PowerTool Menus

The PowerTool menus provide access to additional power management features.

- Battery
- System
- Profile

Battery

The Battery menu provides access to the battery management, battery priority, and calibration features.

Battery Management

The battery management dialog indicates the number and locations of each installed battery, including capacity, state and availability to the system. Battery capacity is shown in bargraph and numerical form by the battery indicators displayed. Below each battery indicator are two rows of selection check boxes.

The first row of selection check boxes allow you to enable or disable a specific battery. Disabling a battery prevents it from being used if AC power is interrupted. This feature is useful if the user has a specific purpose for a battery and does not want it discharged. The second of these rows of selection check boxes toggle a battery between **Charging** (if AC power is available to the system), **In Use** (discharging) if no AC power is available, and **Resetting** if the battery is being recalibrated.

If a battery is not being discharged or charged the displayed battery state is shown as **Idle**, unless a battery requires calibration. If a battery requires calibration, the word **Calibrate** is displayed beneath the applicable battery indictor. If the battery is being calibrated, the word **Resetting** is displayed.

Note: Batteries requiring calibration should be recalibrated at your earliest opportunity. Battery calibration requires connection to AC power.

Battery indicators which are grayed out show batteries that are not currently installed.

The Battery Management dialog also allows you to immediately query the system to update existing battery management information by pressing **Reprobe**. The PowerTool continually monitors and queries the workstation for the most up to date battery information.

You can reach this dialog by opening the main Battery pull-down menu and selecting Battery Management from the PowerTool dialog.

Figure 4-2 shows the Battery Management dialog.

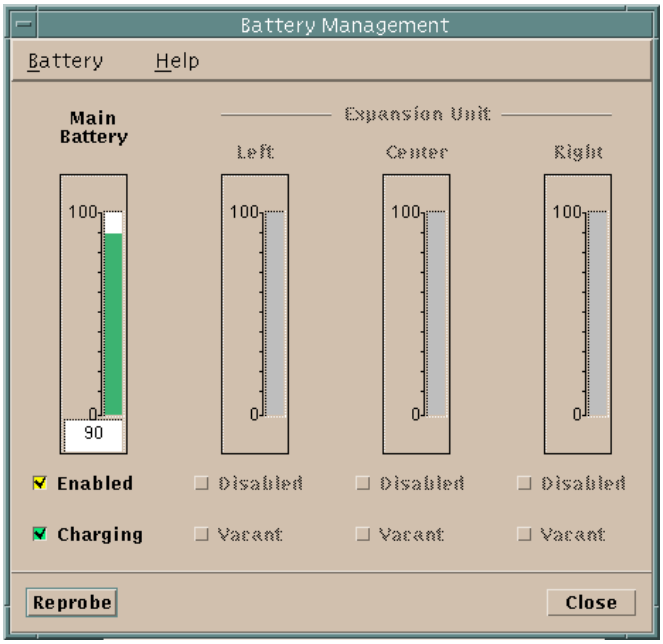


Figure 4-2 Battery Management

Battery Priority

The Battery Priority dialog allows you to establish a first choice priority of use for the battery modules installed in your system. Making a selection here directs the system to use a specific battery module before all others when running on battery power. You can reach this dialog by opening the main Battery menu and selecting Battery Priority from the PowerTool dialog.

Figure 4-3 shows the Battery Priority dialog.

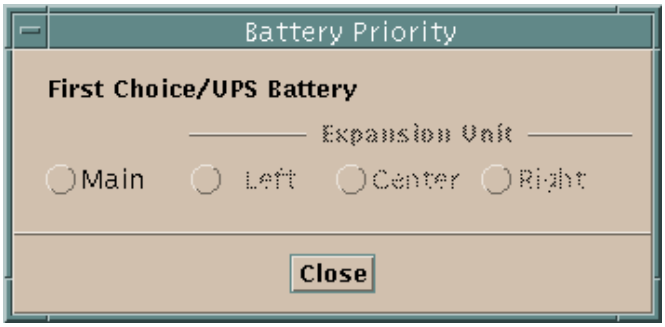


Figure 4-3 Battery Priority

Calibration

The Calibration dialog allows you to calibrate a specific battery for use with the PowerTool Fuel Gauge shown in Figure 4-1. You can calibrate the main system battery or any battery installed in the systems expansion unit by pressing **Calibrate** at the Calibration dialog. You can reach this dialog by opening the main Battery menu and selecting Calibration from the PowerTool dialog.

The calibration process can be stopped anytime by pressing the **Resetting** check box on the Battery Management dialog. The calibration process is completed when the **Resetting** check box changes to read **Idle**.

Figure 4-4 shows the Calibration dialog.

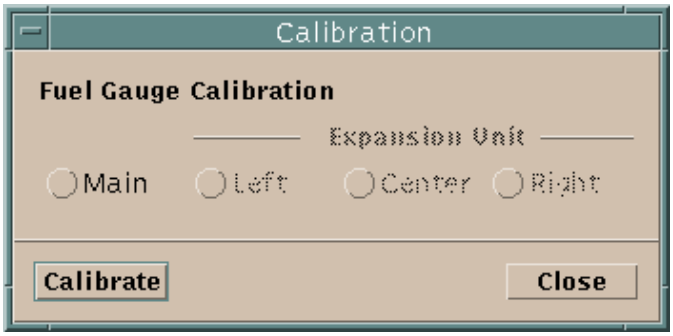


Figure 4-4 Calibration

System

The System menu provides access to PowerTool system control features, including audible warnings, screen blanking, powering down and system suspension behavior, and system speaker settings. You can also restore system control defaults at this dialog by pressing **Restore Defaults**. You can reach this dialog by opening the System menu and selecting System Control from the PowerTool dialog.

Figure 4-5 shows the System Control dialog.

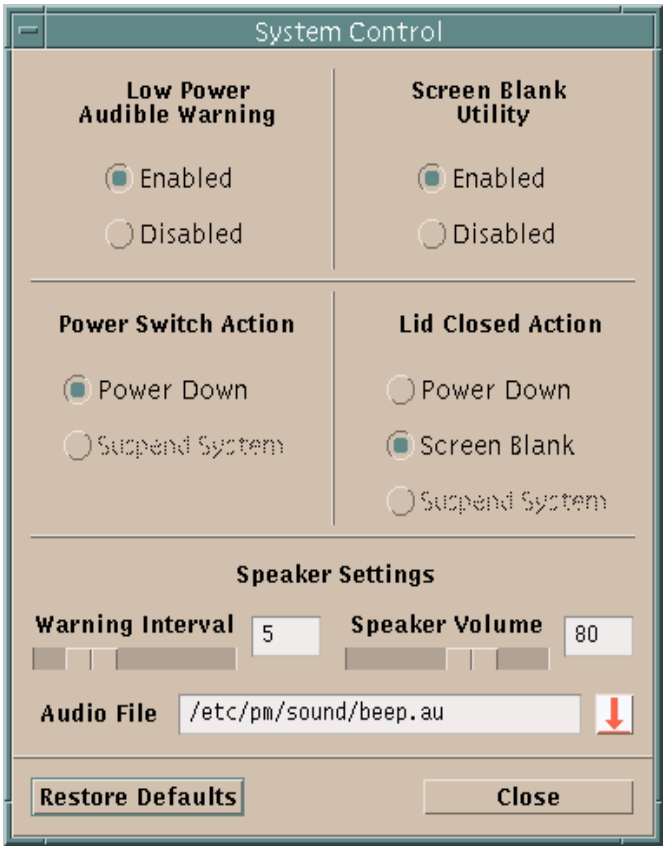


Figure 4-5 System Control

Note: The **Power Switch Action**, **Lid Close Action,** and **Screen Blank Utility** are not currently supported in this release of the PrecisionBook. Contact your authorized PrecisionBook representative for more information.

Profile

The PowerTool Profile menu provides access to the system power management profile. The power management profile is easily reviewed or changed by using the Power Management Profile dialog. Pressing Details allows you to set details specific to your power management profile and the section of that profile you want to change. Pressing Restore Defaults allows you to restore the system defaults to your power management profile. You can reach this dialog by opening the Profile menu and selecting Power Management Profile from the PowerTool dialog.

Figure 4-6 shows the Power Management Profile dialog.

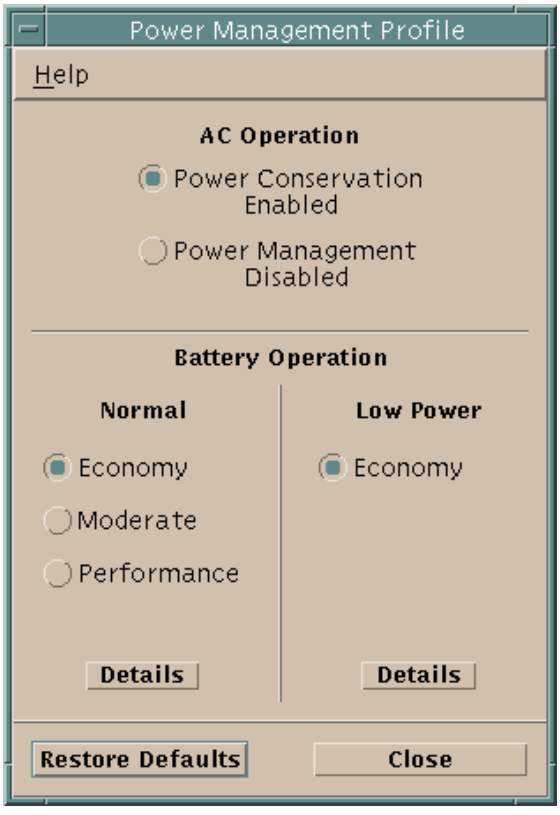


Figure 4-6 Power Management Profile

Figure 4-7 shows the details dialog for the Low Power section of the Power Management Profile dialog.

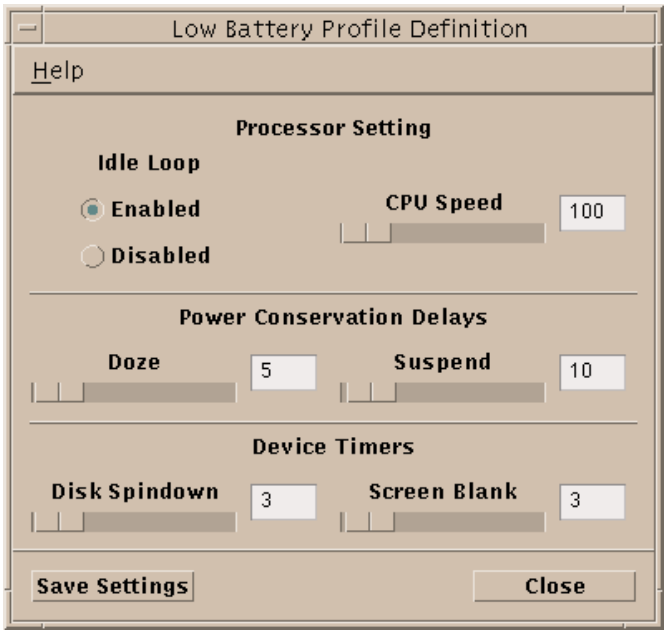


Figure 4-7 Low Battery Profile Definition

Note: **Power Conservation Delays** and **CPU Speed** are not supported at this time. These features will be supported in future releases of the PowerTool software. Contact your authorized RDI representative for current updates and related product information.

The PowerTool Configuration File

The following shows the contents of the Power Management Configuration file distributed on the RDI Software CD.

Caution: RDI does not recommend modifying or changing the PowerTool Configuration file. Modifying this file can seriously degrade workstation performance.

Table 4-1 Power Management Configuration File

```
# SCCS ID "@(#)pm.cf           1.12 -- MODIFIED 12 Apr 1995 11:45:05"
# Configuration file for the RDI 'pmd' (Power Management Daemon)
# and Powertool GUI interface.
#
#   Legend:1 = ON/ENABLED, 0 = OFF/DISABLED
#
#     Battery Operation Mode Settings
#
#                    Disk                    SCrn    Idle
#            MHZ     Timer    Doze  Suspend  Blank   Loop
#
E_DEF        100     3        5     10       3        1
M_DEF        180     5        10    30       5        1
P_DEF        200     10       30    60       10       0
C_DEF        XXX     X        X     XX       X        X
LC_DEF       XXX     X        X     XX       X        X
#
# = System Control
#
#      - Low Power Audible Warning
#
AUDIO           1
#
#      - Screen Blank Utility
#
SCREEN_BLANK    1
#
#      - Power Switch Action
#      - Exhausted Battery Action (uses same button action)
#        Valid are POWER_DOWN, SCREEN_BLANK and SUSPEND
#        for BUTTON_ACTION and LID_ACTION
#
BUTTON_ACTIONPOWER_DOWN
#
#      - Lid Close Action
#
LID_ACTIONPOWER_DOWN
#
#      - Volume to play the audible file at (0 to 120):
#
VOLUME       80
#
#      - Delay between Audible Warnings
#
AUDIBLE_TIMER5
#
#      - File to use for audible warning
#
```

Table 4-1 Power Management Configuration File

```
SOUNDFILE/etc/pm/sound/male.au
#
#     - Action Definitions
#
SUSPEND     /usr/openwin/bin/rdi-suspend
POWER_DOWN /etc/pm/power-off
#
# = Power Management Profile
#
#     - AC Power Conservation Measures
#
POWER_CONSERVATION  0
#
#     - AC Power Conservation Parameters
#
AC_OP         200   10    30    60    10    0
AC_SAVE_OP    140   10    30    60    10    0
#
#    - Battery Operation
#     Choices: E- Economy, M - Moderate, P - Performance, C - Customized
#
BATTERY_OPERATION   P
LOW_BATTERY_OPERATION   E
#
#            --- Noconfigurable Parameters ---
#
# The remaining options below can not be set via the PowerTool
# and must be changed by hand.  CAUTION:  These settings are
# not recommended to be changed.
#
#     Battery levels in percentage (%):
#           Warning Shutdown
#
BLEVELS     15                5
#
# Intervals to sample available battery power
#
#           Normal  Warning
BATTERY_TIMER 15    5
#
# When power gets into the Low Battery Interval execute:
#
WARN_ACTION/usr/openwin/bin/powertool -iconic
```


Note: The BUTTON_ACTION, LID_ACTION, and SUSPEND functions are not supported in this release of the PrecisionBook. Contact your authorized PrecisionBook representative for more information.

Note: Since the CPU speed setting function is not supported in this release, the CPU speed specified in the Batter Operation Mode setting and AC Power Conservation parameters is not applicable to the PrecisionBook.

A PrecisionBook Specifications

Operating System	HP-UX 10.20, or better, CDE OSF/Motif, X11 Window System
Network support	NCS, NFS, Berkley 4.3
Power management	PowerTools supporting multiple power modes and battery management
	LCD blanking
	Graphics shutdown and low-power mode
	Hard disk spin down
	Idle loop optimization
	User definable power management profiles
Processor	PA-7300LC @ 180 or 132 MHz
Performance	180 MHz
	9.22 SPECint95
	9.43 SPECfP95
	132 MHz
	6.49 SPECint95
	6.54 SPECfp95
Memory	l80/132 Series
	32 to 512 MB DRAM with ECC Memory expansion using daughter boards (user installable)

Cache	l80/132 Series 64 KB data 64 KB instruction on-chip 1 MB optional secondary cache
Media	External Floppy Drive (Optional): 3.5 inch 1.44 MB capacity auto-sensing, 15-pin connector Hard Disk Drive: SCSI-II 4 GB formatted 13 ms average seek time. Optional 2- or 3-drive configuration (12 GB total capacity) PCMCIA: One or two Type I and/or Type II, One Type III
Graphics	HP VISUALIZE-EG with 4 MB frame buffer memory (supports 1600x1280 external monitors)
Display	**14.1** XGA 1024 x 768 active matrix LCD
Palette	
Colors	16 M
Gray Scale	256
Pixel aspect ratio	1:1
Screen aspect ratio	4:3
Dot pitch	.28 mm
Dots per inch	90.7

Display height	8.36 in (214 mm)
Display width	11.14 in (286 mm)
Display Diagonal	14.1 in (358 mm)

Display	**12.1** XGA 1024 x 768 active matrix LCD
Palette	
Colors	16 M
Gray Scale	256
Pixel aspect ratio	1:1
Screen aspect ratio	4:3
Dot pitch	.24mm
Dots per inch	106
Display height	7.26 in (185 mm)
Display width	9.69 in (246 mm)
Display Diagonal	12.1 in (308 mm)
External monitors	Supports 16 million colors and resolutions of 1600x1280, 1280x1024, 1024x768, 800x600, and 640x480
Keyboard	PS/2 standard, 97 full-travel keys, 12 Function keys
Touchpad	Three-button integrated

I/O Ports	Ethernet (10 Mbps) twisted pair standard (10-BaseT & AUI) port
	SCSI-II interface, 50-pin connector
	Two RS-232C serial ports
	Centronics-compatible parallel port
	One 16-bit audio port (48 kHz) stereo
	Internal speaker
	Microphone input jack
	External video: VGA-style 15-pin D sub
	Separate Mouse and Keyboard connectors: 6-pin, mini-DIN connectors, PC type
Controls	Power on/off switch
	Display brightness (F-11, F-12 keyboard function keys)
Other Features	Time-of-day clock with separate battery backup
	Carrying case
	Simultaneous display capabilities with connection to XGA resolution external monitor or projection panel
System Dimensions	
Height	2.3 inches (58 mm)
Width	12.84 inches (326 mm)
Length	11.66 inches (296 mm)
Volume	0.18 cu. ft. (0.005 cu. m)
Weight	7.5 pounds (3.4 kg) without battery

Environmental	
Altitude	0 to 10,000 ft. (0 to 3048 m)
Operating temperature	+40 to +104 degrees F (4 to 40 degrees C) Temperature sensitive fan speed
Storage temperature	- 4 to +140 degrees F (-20 to + 60 degrees C)
Battery/Power Supply	Lithium-Ion battery, 10 V nominal, 40 watt-hour capacity
Charge life	Approximately 1 to 2 hours (application dependent)
Recharge time	2.5 hours, system off
Battery weight	1.0 pounds (.45 kg)
	QuikCheck status gauge on battery pack
AC Adapter/Charger	Automatic voltage and frequency sensing
Voltage	90-264 VAC
Frequency	47-63 Hz
Power supply	70 W continuous
DC output	18 VDC @ 3.68 A
Length	5.24 in (133 mm)
Width	2.28 in (58 mm)
Height	1.15 in (29 mm)
Weight	.58 lbs (0.26 kg)

AC Adapter/Charger (cont'd)	
AC cord	2-terminal UL/CSA approved 6 ft. (1.8 m)
DC cord	3 ft (0.9 m) Class II, UL 1950, IEC 950, EN 60950
Regulatory Compliance	Safety
	Class UL 1950, CSA C22.2 No. 950, TUV (EN 60950), CE
	EMC
	ITE-FCC Part 15 (Class B)
	Class B, CE (EN55022 Class B, EN50081-1, EN 50082-1, IEC 801-2, IEC 801-3, IEC 801-4)
Options	Expansion memory daughter boards
	Removable disk drive upgrades
	Expansion dock
	Supports optional hard disks, battery packs, internal floppy drive, CD-ROM, expansion PCI bus slot, battery charge, I/O port replication
	56 K/bps PCMCIA Fax/modem card with cell phone support
	Nylon carrying case
	Antiglare screen
	Extra battery pack
	Hard carrying case
	Extra manual set

B Connector Pin Assignments

This appendix describes the pin assignments for the PrecisionBook connectors listed in Table B-1. The connectors are listed in the order they appear on the PrecisionBook, beginning with the front-most access port on the right side of the unit.

Table B-1 PrecisionBook Connectors

Caution: Only external floppy drive options supplied by RDI should be used with this connector. Use of other external devices with this connector may cause equipment damage and void your warranty.

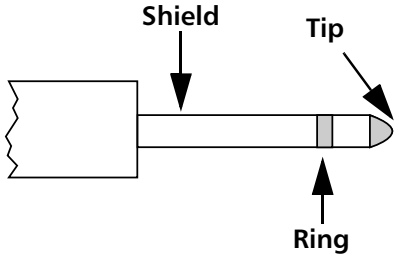
Headphones Connector

The headphones connector is a standard female, 1/8 in, audio miniature jack. Table B-2 lists the pin assignments for this connector. For illustration purposes, Figure B-1 shows the 1/8” male connector.

Table B-2 Headphones Connector Pin Assignments

Pin	Signal
Tip	LEFT CHANNEL
Ring	RIGHT CHANNEL
Shield	GND

Figure B-1 Headphones Mating Connector



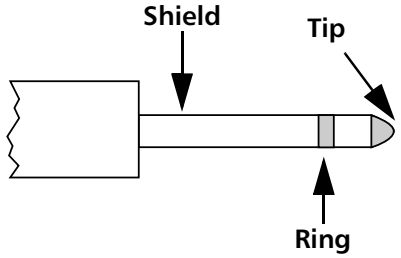
Audio Line In Connector

The audio line in connector is a standard female, 1/8 in, audio miniature jack. Table B-3 lists the pin assignments for this connector. For illustration purposes, Figure B-2 shows the 1/8” male connector.

Table B-3 Audio Line In Connector Pin Assignments

Pin	Signal
Tip	LEFT CHANNEL
Ring	RIGHT CHANNEL
Shield	GND

Figure B-2 Audio Line In Mating Connector



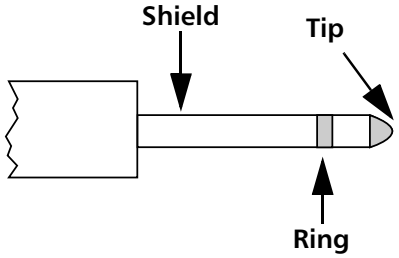
Audio Line Out Connector

The audio line out connector is a standard female, 1/8 in, audio miniature jack. Table B-4 lists the pin assignments for this connector. For illustration purposes, Figure B-3 shows the 1/8” male connector.

Table B-4 Audio Line Out Connector Pin Assignments

Pin	Signal
Tip	LEFT CHANNEL
Ring	RIGHT CHANNEL
Shield	GND

Figure B-3 Audio Line Out Mating Connector



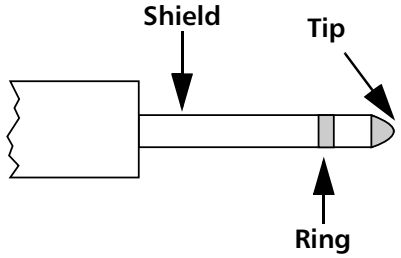
Microphone Connector

The microphone connector is a standard female, 1/8 in, audio miniature jack. Table B-5 lists the pin assignments for this connector. For illustration purposes, Figure B-4 shows the 1/8” male connector.

Table B-5 Microphone Connector Pin Assignments

Pin	Signal
Tip	MONO
Ring	ACTIVE SUPPLY
Shield	GND

Figure B-4 Microphone Mating Connector



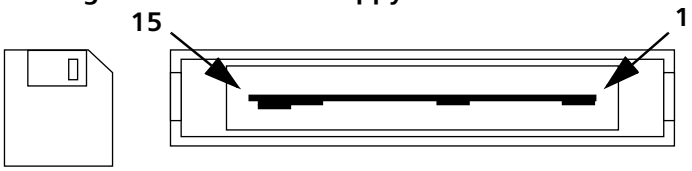
External Floppy Drive Connector

The floppy drive connector is a male, 15-pin, single-row, polarized connector. Table B-6 lists the pin assignments for this connector. Figure B-5 shows this connector.

Table B-6 External Floppy Connector Pin Assignments

Pin	Signal
1	FD_HD_SEL_L
2	FD_RD_DAT_L
3	GND
4	FD_WR_PROT_L
5	GND
6	FD_TRK0_L
7	FD_WR_GATE_L
8	FD_WR_DAT_L
9	FD_STEP_L
10	FD_DIR_L
11	FD_DSK_CHNG_L
12	+5V
13	+5V
14	FD_DRV0_SEL_L
15	FD_INDEX_L

Figure B-5 External Floppy Drive Connector



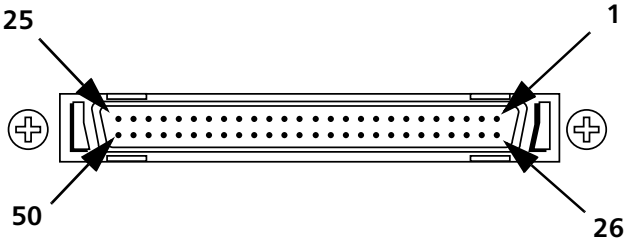
SCSI-II Connector

The SCSI-2 connector is a female, 50-pin double-row polarized connector. Table B-7 lists the pin assignments for this connector. Figure B-6 shows this connector.

Table B-7. SCSI-2 Connector Pin Assignments

Pin	Signal	Pin	Signal
1 - 11	Ground	36	Ground
12	Ground	37	Ground
13	NC	38	TRMPWR
14	Ground	39	Ground
15 - 25	Ground	40	Ground
26	SD0-	41	ATN- (Attention-)
27	SD1-	42	Ground
28	SD2-	43	BSY- (Busy-)
29	SD3-	44	ACK- (Acknowledge-)
30	SD4-	45	RST- (Reset-)
31	SD5-	46	MSG- (Message-)
32	SD6-	47	SEL- (Select-)
33	SD7-	48	CD- (Command Data-)
34	SDP- (SCSI Parity)	49	REQ- (Request-)
35	Ground	50	IO (Input/Output Direction-)

Figure B-6 SCSI-II Connector



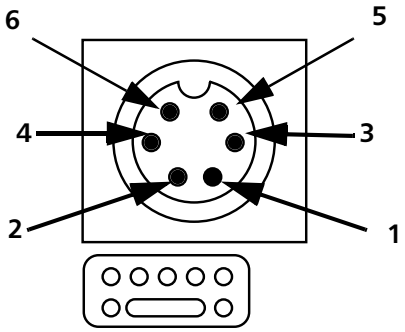
Keyboard Connector

The keyboard connector is a female, 6-pin miniature (DIN-6) PS/2 connector. Table B-8 lists the pin assignments for this connector. Figure B-7 shows this connector.

Table B-8 Keyboard Connector Pin Assignments

Pin	Signal
1	Keyboard Data
2	Not Used
3	GND
4	+5V
5	Keyboard Clock
6	Not Used

Figure B-7 Keyboard Connector



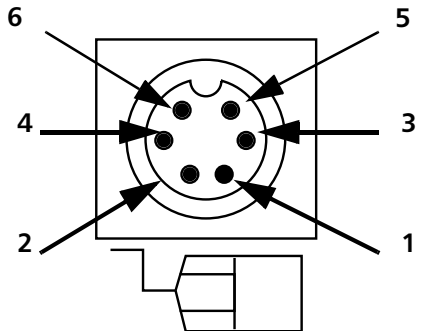
Mouse Connector

The mouse connector is a female, 6-pin miniature (DIN-6) PS/2 connector. Table B-9 lists the pin assignments for this connector. Figure B-8 shows this connector.

Table B-9 Mouse Connector Pin Assignments

Pin	Signal
1	Mouse Data
2	Not Used
3	GND
4	+5V
5	Mouse Clock
6	Not Used

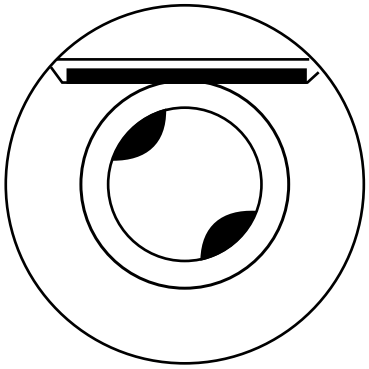
Figure B-8 Mouse Connector



DC Input Connector

The DC input connector provides DC power to the unit. Figure B-9 shows this connector.

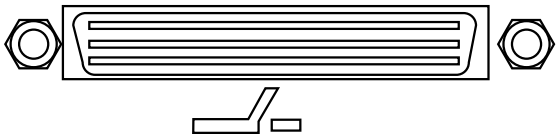
Figure B-9 DC Input Connector



Docking Connector

The PrecisionBook docking connector uses a proprietary 300-pin connector to enable docking functionality. For more information on using this connector, contact RDI Customer Support. Figure B-10 shows this connector.

Figure B-10 Docking Connector



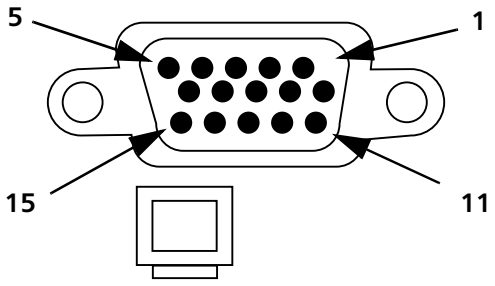
External Monitor Connector

The external monitor connector is a female, 15-pin standard VGA connector. Table B-10 lists the pin assignments for this connector. Figure B-11 shows this connector.

Table B-10 External Monitor Connector Pin Assignments

Pin	Signal	Pin	Signal
1	Red	9	Not Used
2	Green	10	Digital GND
3	Blue	11	Not Used
4	Not Used	12	Not Used
5	Digital GND	13	HSYNC
6	Analog GND	14	VSYNC
7	Analog GND	15	Not Used
8	Analog GND		

Figure B-11 External Monitor Connector



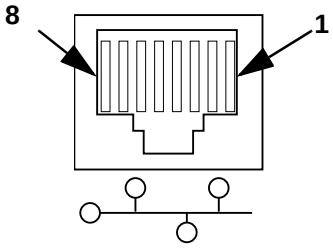
Ethernet Twisted-Pair Connector

The Ethernet twisted-pair connector is a female, 8-pin miniature RJ-45 telephone jack. Table B-11 lists the pin assignments for this connector. Figure B-12 shows this connector.

Table B-11 Ethernet Twisted-Pair Connector Pin Assignments

Pin	Signal
1	TXD+
2	TXD–
3	RXD+
4	Not Used
5	Not Used
6	RXD–
7	Not Used
8	Not Used

Figure B-12 Ethernet Twisted-Pair Connector



Dual Serial, Parallel, and AUI Connector

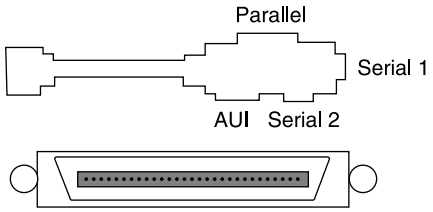
The dual serial, parallel, and AUI connector on the PrecisionBook back panel is a female, 50-pin double-row polarized connector. Table B-12 lists the pin assignments and Figure B-13 shows this connector.

Table B-12 Dual Serial/Parallel Connector Pin Assignments

Pin	Signal	Pin	Signal	Pin	Signal
1	GND	18	BPARD7	35	BSER2RXD
2	GND	19	BPARSLCT	36	BSER2R#
3	BPARAFD#	20	GND	37	BSER2RTS#
4	BPARAD0	21	GND	38	BSER2DSR#
5	BPARAERR#	22	BSER1DTR#	39	BSER2CTS#
6	BPARAD1	23	BSER1TXD	40	GND
7	BPARINIT#	24	BSER1DCD#	41	GND
8	BPARD2	25	BSER1RXD	42	AUIR
9	BPARSLIN#	26	BSER1R#	43	AUIC **
10	BPARD3	27	BSER1RTS#	44	AUIR **
11	BPARSTB#	28	BSER1DSR#	45	AUIC#
12	BPARD4	29	BSER1CTS#	46	GND
13	BPARACK#	30	GND	47	+12V
14	BPARD5	31	GND	48	AUIT
15	BPARBUSY	32	BSER2DTR#	49	+12V
16	BPARD6	33	BSER2TXD	50	AUIT# **
17	BPARPE	34	BSER2DCD#		

Note: Two asterisks (**) indicate twisted pair wiring.

Figure B-13 Dual Serial/Parallel Connector



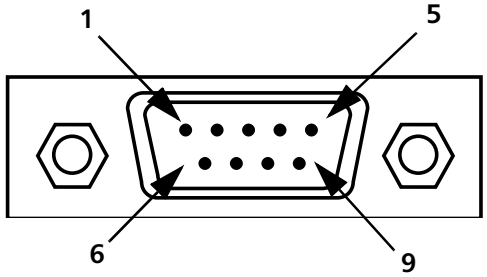
Serial Port-1 Connector

The serial port-1 connector on the I/O break-out cable is a female, 9-pin (DB9) connector. Table B-13 lists the pin assignments for this connector. Figure B-14 shows this connector.

Table B-13 Serial Port-1 Connector Pin Assignments

Pin	Signal
1	DCD#
2	RXD
3	TXD
4	DTR#
5	GND
6	DSR#
7	RTS#
8	CTS#
9	R#

Figure B-14 Serial Port-1 Connector



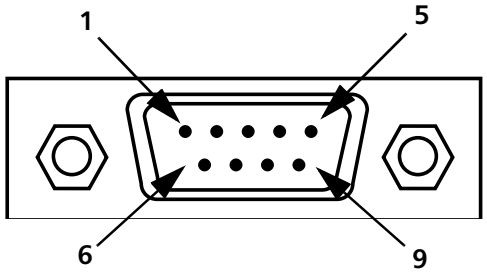
Serial Port-2 Connector

The serial port-2 connector on the I/O break-out cable is a female, 9-pin (DB9) connector. Table B-14 lists the pin assignments for this connector. Figure B-15 shows this connector.

Table B-14 Serial Port-2 Connector Pin Assignments

Pin	Signal
1	BSER2DCD#
2	BSER2RXD
3	BSER2TXD
4	BSER2DTR#
5	GND
6	BSER2DSR#
7	BSER2RTS#
8	BSER2CTS#
9	BSER2R#

Figure B-15 Serial Port-2 Connector



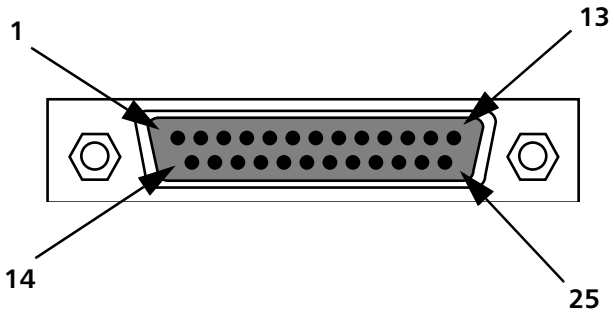
Parallel Port Connector

The parallel port connector on the I/O break-out cable is a Centronics-compatible, female 25-pin (DB25) connector. Table B-15 lists the pin assignments for this connector. Figure B-16 shows this connector.

Table B-15 Parallel Port Connector Pin Assignments

Pin	Signal	Pin	Signal
1	STB#	10	ACK#
2	D0	11	BUSY
3	D1	12	PE
4	D2	13	SLCT
5	D3	14	AFD#
6	D4	15	ERR#
7	D5	16	INIT#
8	D6	17	SLIN#
9	D7	18-25	GND

Figure B-16 Parallel Port Connector



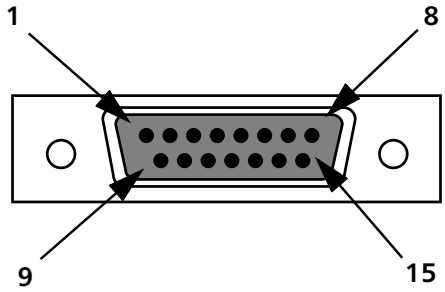
AUI Connector

The AUI connector on the I/O break-out cable is a female, 15-pin (DB-15) connector. Table B-16 lists the pin assignments for this connector. Figure B-17 shows this connector.

Table B-16. AUI Connector Pin Assignments

Pin	Signal
1	GND
2	AUIC
3	AUIT
4	GND
5	AUIR
6	GND
7	NC
8	GND
9	AUIC#
10	AUIT#
11	GND
12	AUIR#
13	+12V
14	GND
15	NC

Figure B-17 AUI Connector



Notes

C External Monitor Matrix

The PrecisionBook is delivered with either a 1024 x 768 pixel resolution 12.1 inch or 14.1 inch Liquid Crystal Display (LCD). It also has the option to drive external monitors. In some combinations, the PrecisionBook can drive both the LCD and an external monitor simultaneously. This list charts the various combinations and monitor type selections needed to activate them.

PrecisionBook LCD Resolution	External Monitor Resolution
LCD Only Operation	**External Monitor Only Operation**
1024x768 62Hz (256K Colors)	
Note: The RDI LCD display mode must be disabled to use a Type 5 monitor for external display.	Type 1 1280x1024 75Hz Type 2 1280x1024 75Hz (Double buffered) Type 3 1280x1024 75Hz Greyscale Type 4 1280x1024 75Hz (Double buffered, Greyscale) Type 5 1024x768 75Hz Type 6 800x600 75Hz Type 7 640x480 75Hz Type 8 1600x1200 75Hz

PrecisionBook LCD Resolution	External Monitor Resolution
	Type 9 1600x1200 75Hz (Greyscale) Type 10 1200x1600 75Hz Type 11 1200x1600 75Hz (Greyscale) Type 12 1280x1024 72Hz Type 13 1280x1024 72Hz (Double buffered) Type 14 640x480 60Hz Type 15 -user defined-
Simultaneous Operation 1024x768 62Hz (256K Colors)	Type 5 1024x768 62Hz

Note: Simultaneous display is supported in 1024x768 mode for Proxima LCD projection panels and projectors.

Changing Resolutions

Changing the display resolution can only be done during the boot sequence, either during start-up or rebooting specifically to change the resolution.

1. Enter the command interpreter mode by pressing any character when the following system message appears:

```
Processor is booting from first available device.

To discontinue, press any key within 10 seconds.
```

The workstation will now be in HP boot PROM mode. You can now execute PROM commands.

2. Enter the configuration menu and use the **MOnitor** command to set the monitor resolution.

–or–

3. Press **Tab** when you see the following system message:

```
To select a new graphics monitor type, press the [TAB] key now.
Otherwise, EXIT by entering any other key. The system will time out
in 15 seconds...
```

Note: You can use the PROM commands **configure monitor**, **rdi lcd**, **rdi external**, to change monitor resolutions. The PROM also contains useful menus and help information to guide you while using these commands.

Notes

D PrecisionBook Fax/modem Information

This document lists the AT commands, S registers, and responses supported by the PrecisionBook's PCMCIA FAX/modem.

AT Commands

Table E-1 shows the AT commands supported by the PrecisionBook FAX/modem.

Note: Default settings are shown in **bold**.

Table E-1. AT Commands

Command	Explanation
A	Answer Command. This command causes the modem to attempt to answer an incoming call. The modem will make its attempt regardless of whether the modem is in auto-answer mode or not. This command should be issued after the RING result code is seen (when another modem is attempting to connect).
A/	Re-executes the previous command line. This command is NOT preceded by AT or followed by <Enter>.
Bn	CCITT/Bell Setting. This command selects either the CCITT standard or the Bell standard for 300 and 1200 bps communications. B0 CCITT V.22 for 1200bps, CCITT V.21 for 300bps. **B1 BELL 212A FOR 1200BPS, BELL 103 FOR 300BPS.**
C1	Carrier Control Command. This command is included for compatibility only and performs no function other than to return an OK message.

Table E-1. AT Commands

Command	Explanation
Dn	Dial Command. This command directs the modem to go off-hook, wait for a dialtone, and dial the number indicated in the dial string, n. The dial string may contain the characters 0-9 for pulse-mode dialing or 0-9, A-D, *, and # for touch-tone dialing. Spaces, hyphens, and parentheses can be included in the command to improve readability. For example, D (123) 456-7890 and D1234567890 are equivalent. In addition, the dial string may contain these dial command modifiers: L — Redial the last valid telephone number entered. P — Pulse-mode dialing. (See S14.) T — Touch-tone dialing. (See S14.) S=n — Dial 1 of 4 stored telephone numbers, where n is 0, 1, 2, or 3. (See &Zn) W — Wait for a dialtone. (See S7.) , — Pause before dialing the digits that follow. (See S8.) @ — Wait for quiet answer. Wait for one or more rings followed by at least five seconds of silence before continuing with execution of the dial string. This is useful for transferring calls on some PBX systems. ; — Return the modem to command state. When placed at the end of the dial string, this puts the modem into command mode. While in command mode, the modem will not attempt to connect with the remote modem. In addition, the dial string may contain these dial command modifiers: L — Redial the last valid telephone number entered. P — Pulse-mode dialing. (See S14.) T — Touch-tone dialing. (See S14.) S=n — Dial 1 of 4 stored telephone numbers, where n is 0, 1, 2, or 3. (See &Zn) W — Wait for a dialtone. (See S7.) , — Pause before dialing the digits that follow. (See S8.) @ — Wait for quiet answer. Wait for one or more rings followed by at least five seconds of silence before continuing with execution of the dial string. This is useful for transferring calls on some PBX systems.

Table E-1. AT Commands

Command	Explanation
	; Return the modem to command state. When placed at the end of the dial string, this puts the modem into command mode. While in command mode, the modem will not attempt to connect with the remote modem. In addition, the dial string may contain these dial command modifiers: L Redial the last valid telephone number entered. PPulse-mode dialing. (See S14.) T Touch-tone dialing. (See S14.) S=n Dial 1 of 4 stored telephone numbers, where n is 0, 1, 2, or 3. (See &Zn) WWait for a dialtone. (See S7.) , Pause before dialing the digits that follow. (See S8.) @ Wait for quiet answer. Wait for one or more rings followed by at least five seconds of silence before continuing with execution of the dial string. This is useful for transferring calls on some PBX systems. ; Return the modem to command state. When placed at the end of the dial string, this puts the modem into command mode. While in command mode, the modem will not attempt to connect with the remote modem. R Accepted but causes no action. En Local Echo Setting. This command determines whether the commands you type are echoed to the screen. (See S14.)
	E0 Disable command echo. E1 ENABLE COMMAND ECHO.
Fn	Line Connection Speed Setting. This command is not supported in V.34 modems and above but reports OK for compatibility. N0 or +MS, and S37 may be used to force a particular connect mode.
Hn	Hang-up Command. H0 On-hook (hang up). H1 Off-hook.

Table E-1. AT Commands

Command	Explanation
In	Identification Command. I0 Reports product code (e. g. 28800). I1 Reports read-only memory (ROM) checksum. This number should always remain the same. I2 Reports OK. I3 Reports ROM revision level and model. I4 Reports modem identifier string. I5 Reports country code (e.g. 022 for U.S.). I6 Reports data pump model and code revision. I7 Reports DAA code for external DAA (if not installed, reports 255)
Ln	Speaker Volume Setting. (See also register S22.) On PCMCIA modems, there may be no discernible difference between some volume levels. L0 Off. L1 Low. L2 Medium. **L3 High.**
Mn	Speaker Control Setting. This command controls when the speaker will be on or off. (See also S22.) M0 Always off. **M1 On during call establishment, off after receiving carrier.** M2 Always on, even during data transmission. M3 On between dialing and carrier detection.
Nn	Automatic Line Speed Detection Setting. (See also S31 and S37.) N0 Automatic line speed detection disabled. Handshaking will be conducted according to the contents of S37. **N1 Automatic line speed detection enabled.**
On	On-line Command. This command switches the modem from command mode to on-line mode. If there is no established connection, ERROR is returned. O0 Go back on-line without a retrain. O1 Go back on-line after initiating a retrain.
P	Pulse-mode Dial Setting. This setting specifies pulse-mode dialing for all subsequent connections. (See *S14*, contrast with *T*.)
Qn	Result Code On/Off Setting. This command determines whether or not the modem returns result codes such as OK, ERROR, or CONNECT. (See *S14, S95, Vn, Wn, Xn*.) **Q0 Display result codes.** Q1 Do not display results codes.

Table E-1. AT Commands

Command	Explanation
Sn?	Read S-register. This command enables you to read the S-register specified by the number n. For example, typing *ATS0?<Enter>* will allow you to view the contents of the *S0* register.
Sn=x	Write to an S-register. This command allow you to change the contents of an S-register. For example *ATS0=2<enter>* writes the value 2 to the *S0* register. ***Note:*** The modem does not perform error checking on values writeen to S-registers. It will always return the OK message. (See *S-Registers* for details on the contents of each S-register.)
T	**Touch-tone Dial Setting.** This setting speciffies touch-tone dialing for all subsequent connections. (See *S14*, contrast with *P*.)
Vn	Result Code Format Setting. (See *S14, S95, Qn, Wn, Xn*.) V0 Numeric result codes. **V1 Verbose result codes.**
Wn	Connection Message Setting. If you change the value of *S95*, it may override the Wn setting. (See *S31, Vn, Qn*.) **W0 Reports DTE rate only.** For example: CONNECT 57600 W1 Reports DCE rate, error correction period, and DTE rate. For example: CARRIER 28800 PROTOCOL: LAPM CONNECT 57600 W2 Reports DCE rate only. For example: CONNECT: 28800
Xn	Extended Result Code Setting. This command selects which call progress result codes are reported. (See S22, S95, Qn, Vn, Wn, and "Result Codes and Messages.") X0 Send basic call progress result codes: OK, CONNECT, RING, NO CARRIER, ERROR, NO ANSWER. X1 Same as X0 but also report rate-specific CONNECT messages. X2 Same as X1 but also report NO DIALTONE detection. X3 Same as X2 but also report BUSY signal detection. **X4 Send all call progress messages.**

Table E-1. AT Commands

Command	Explanation
Yn	Long Space Disconnect String. This command determines whether the modem hangs up when it receives a long space signal (greater than 1.6 seconds) from the remote modem. If enables, the modem will send a 4 second space signal to the remote modem before hanging up. (See *S21.*) **Y0 Disable long space disconnect.** Y1 Enable long space disconnect.
Zn	Modem Reset/Restore Profile Command. Z0 Perform modem reset and restore configuration profile 0 Z1 Perform modem reset and restore configuration profile 1
AT& Commands &Cn	Carrier Detect (CD) Signal Setting. (See *S21.*) &C0 CD always on. **&C1 CD follows state of carrier.**
&Dn	Data Terminal Ready (DTR) Signal Setting. This command affects the interpretation of the DTR signal. ***Note:*** When the modem is online, it ignores a DTR drop that lasts less than the value in *S25,* .05 seconds by default. (See *S21.*) &D0 DTR is ignored. &D1 DTR drop causes the modem to go into command mode. **&D2 Auto-answer is inhibited and a DTR drop causes the modem to hang up.** &D3 DTR drop causes the modem to perform a soft reset.
&Fn	Restore Factory Profile Command. This command will restore one of the two preset factory profiles. These profiles enable automatic line speed detection, hardware flow control, error correction, and data compression. You can also define and store your own specialized profiles. (See *&Wn, &Yn,* and *Zn* for details.)
&Gn	Guard Tone Setting. This command sets the guard tone for V.22 and V.22bis connections. (See S23.) **&G0 No guard tone.** &G1 No guard tone. &G2 1800 Hz guard tone. Used in the U.K. and some other Commonwealth countries.
&Jn	Telephone Jack Setting. The *&J0* and *&J1* commands are included for compatibility only and perform no function other than to return an OK message.

Table E-1. AT Commands

Command	Explanation
&Kn	Flow Control Setting. If your communications software does not support hardware flow control, you will need to specify *&K0* or *&K4* (see below). (See *S39*.) &K0 Disable flow control. **&K3 Enable hardware flow control only.** &K4 Enable software flow control only. &K5 Enable transparent software flow control. &K6 Enable both hardware and software flow control.
&L	Leased Line Setting. The *&L0* command is included for compatibility only and performs no function other than to return an OK message. This modem does not support leased line operation.
&M	Selects a direct connection. This command is equivalent to *&Q0*.
&Pn	Pulse Dial Make/Break Ratio Setting. Enabled on a per country basis (see *S28*), If enabled, the dial make/break ratio is as follows: **&PO 39%-61% dial ratio at 10 pulses per second.** &P1 33% - 67% dial ratio at 10 pulses per second. &P2 39% - 61% dial ratio at 20pulses per second. &P3 33% - 67% dial ratio at 10 pulses per second.
&Qn	Asynchronous Mode Setting. (See S27 and S36.) &Q0 Selects a direct connection. &Q1 Reserved. &Q2 Reserved. &Q3 Reserved.

Table E-1. AT Commands

Command	Explanation
	&Q4 Selects AutoSync operation. The value 100b is written to S27 bits 3.1. and 0. respectively. AutoSync operation. when used in conjunction with the Hayes Synchronous Interface (HSI) capability in the DTE provides synchronous communication capability from an asynchronous terminal. ***Starting AutoSync:*** Set registers S19, S20, and S25 to the desired values before selecting AutoSync operation with &Q4. After the CONNECT message is issued. the modem waits the period of time specified by S25 before examining DTR. If DTR is on. the modem enters the synchronous operating state: if DTR is off. the modem terminates the line connection and returns to the asynchronous command state. ***Stopping AutoSync:*** AutoSync operation is stopped upon loss of carrier or the on-to-off transition of DTR. Loss of carrier will cause the modem to return to the asynchronous command state. An on-to-off transition of DTR will cause the modem to return to the asynchronous command state and either not terminate the line connection (&D1 active) or terminate the line connection (any other &Dn command active). **&Q5 Selects a reliable connection. The value in S36 will determine whether or not a failure to establish a particular error correction link will result in the modem hanging up or trying to make another type of connection.** (See also \N2, \N3, \N4, and \N5.) &Q6 Selects normal connection. (Equivalent to \N0.)
&Rn	Hardware Flow Control Setting. This command selects how the modem controls its Clear to Send (CTS) signal if hardware flow control is selected. (See *S21.*) &S0 CTS is always on. **&S1 CTS will drop only if required by flow control.**
&Sn	Data Set Ready (DSR) Signal Setting. (See S21.) **&S0 DSR always on.** &S1 DSR is active after an answer tone has been detected and inactive after the carrier has been lost. Very few communications packages require this setting.
&Tn	Diagnostic Test Commands. This set of commands provides diagnostic tests that comply with the CCITT V.54 recommendations.

Table E-1. AT Commands

Command	Explanation
	All connections established during testing must be normal or direct connections. (See \N0, +Q0, S16, S181.) &T0 Terminate test in progress. Generally during a test the modem is on-line. Therefore to issue this command you will need to type the escape sequence +++ and wait for the OK message. You can then type AT&T0 <Enter> to terminate the test. Alternatively, if S18 is non-zero, a test will terminate automatically after the number of seconds specified in S18. &T1 Local analog loopback test. This test checks the operation of your modem's transmitter and receiver. For example: 1. Your modem should be on-hook and in command mode. Type AT\N0 <Enter>. This specifies a normal connection. 2. Type AT S18=10 <Enter>. This specifies a test period of 10 seconds. 3. Type AT &T1 <Enter>. This initiates the local analog loopback test. 4. Type a simple character pattern. If your modem is working properly, you will see this character pattern echoed to the screen. 5. The test will end automatically after 10 seconds. 6. Return your modem to its original state by typing ATZ <Enter>. &T2 Reserved. &T3 Local digital loopback test. This test verifies the operation of two connected modems and the phone channel. For example: 1. Your modem should be on-hook and in command mode. Type AT\N0 <Enter>. This specifies a normal connection. 2. Type AT S18=10 <Enter>. This specifies a test period of 10 seconds. 3. Establish a connection with the remote modem by typing ATDnnn-nnnn <Enter>. Wait for the CONNECT message. 4. Issue the escape sequence to put the modem back into command mode (type +++ without pressing <Enter>). When you see the OK message, your modem is in command mode. 5. Issue the command AT &T3 <Enter>. This initiates the local digital loopback test.

Table E-1. AT Commands

Command	Explanation
	6. Have someone at the remote modem type a simple character pattern. This character pattern then loops through your modem back to the remote modem. Everything is working properly if the original character pattern is echoed back to the remote user's screen. 7. The test will end automatically after 10 seconds. 8. When your testing is complete, hang up the line and return your modem to its original state by typing ATHZ <Enter>. &T4 Allows local modem to accept a request from the remote modem for a remote digital loopback test. (See S23.) **&T5 Prohibits local modem from accepting a request from the remote modem for a remote digital loopback test.** (See S23.) &T6 Remote digital loopback test. This test verifies the operation of two connected modems and the phone channel. For example: 1. Your modem should be on-hook and in command mode. Type AT\N0 <Enter>. 2. Type AT S18=10 <Enter>. This specifies a test period of 10 seconds. 3. Establish a connection with the remote modem by typing AT Dnnn-nnnn <Enter>. Wait for the CONNECT message. 4. Issue the escape sequence to put the modem back into command mode (type +++ without pressing <Enter>). When you see the OK message, your modem is in command mode. 5. Issue the command AT &T6 <Enter>. This initiates the remote digital loopback test. Note that the remote modem must support CCITT V.54 and must be prepared to accept the request for this test. (See &T4.) 6. Type a simple character pattern and verify that what you type is echoed correctly to your screen. 7. The test will end automatically after 10 seconds. 8. When your testing is complete, hang up the line and return your modem to its original state by typing ATHZ <Enter>. &T7 Remote digital loopback with self-test. This test verifies the operation of two connected modems and the phone channel. It sends an internal test pattern through the loop and returns a numeric message that indicates the number of errors

Table E-1. AT Commands

Command	Explanation
	that were counted during the test period. (See &T6.) For example: 1. Your modem should be on-hook and in command mode. Type AT \N0 <Enter>. 2. Type AT S18=10 <Enter>. This specifies a test period of 10 seconds. 3. Establish a connection with the remote modem by typing AT Dnnn-nnnn <Enter>. Wait for the CONNECT message. 4. Issue the escape sequence to put the modem back into command mode (type +++ without pressing <Enter>). When you see the OK message, your modem is in command mode. 5. Issue the command AT &T7 <Enter>. This initiates the remote digital loopback with self-test. Note that the remote modem must support CCITT V.54 and must be prepared to accept the request for this test. (See &T4.) 6. The test will end automatically after 10 seconds. The number of errors that were counted are displayed on your screen at the end of the test. 000 means that there were no errors. 255 means that there were 255 or more errors. 7. When your testing is complete, hang up the line and return your modem to its original state by typing ATHZ <Enter>.
&T8	Local analog loopback with self-test. This test checks the operation of your modem's transmitter and receiver. It sends an internal test pattern through the loop and returns a numeric message that indicates the number of errors that were counted during the test period. (See &T1.) For example: 1. Your modem should be on-hook and in command mode. Type AT\N0 <Enter>. This specifies a normal connection. 2. Type AT S18=10 <Enter>. This specifies a test period of 10 seconds. 3. Type AT &T8 <Enter>. This initiates the local analog loopback with self-test. 4. The test will end automatically after 10 seconds. When the test is ended, the modem will display the number of errors detected. 000 means that there were no errors. 255 means that there were 255 or more errors. 5. Return your modem to its original state by typing ATZ <Enter>.

Table E-1. AT Commands

Command	Explanation
&V	View Profiles Command. This command displays the active modem profile, the user-defined profiles, and the stored telephone numbers. (See &Wn and Zn.)
&V1	Display active s-registers (v.34), Display statistics of last connection for 33.6 and 56k configurations.
&Wn	Store Current Profile Command. This command stores the active modem configuration into nonvolatile memory (NVRAM) as user-defined profile 0 or 1. Storable parameters can be viewed with the &V command and recalled with the Zn command. To return to the factory defaults, type AT& F0 <Enter>. &W0 Store the current profile as profile 0. &W1 Store the current profile as profile 1.
&Yn	Default Reset Profile Setting. This command determines which user-defined profile will be used after a power-on reset. **&Y0 Select user-defined stored profile 0.** &Y1 Select user-defined stored profile 1.
&Zn=X	Store Telephone Number Command. This command stores a phone number, X, to phone number entry n, where n is 0, 1, 2, or 3. Each phone number can be up to 34 digits long. Spaces, hyphens, and parentheses are not saved. The purpose of this command is to allow you to abbreviate dial commands. For example, you can store the dial string 9,(123)456-7890 by typing: AT&Z3=9,(123)456-7890 <Enter>. Subsequent calls to this number can be issued with the command ATDS=3 <Enter>. (See Dn, dial modifier S).
AT% Commands %Cn	Compression Control Setting. (See S41 and S46.) %C0 Disable data compression. %C1 Enable MNP 5 data compression only. %C2 Enable V.42bis data compression only. %C3 Enable both V.42bis and MNP 5 data compression.
%En	Line Quality Monitor Setting. (See S41.) %E0 Disable line quality monitoring and auto-retrain. %E1 Enable line quality monitor and auto-retrain. **%E2 Enable line quality monitor and fallback/fall forward.**
%L	Line Signal Level Command. This command reports a value which indicates the received signal level. For example, 004 = -4dBm, 043 = -43dBm, etc.
%Q	Line Signal Quality Command. This command reports the line signal quality. Typical values are in the range from 0 to 2 and increase as the signal quality degrades. Based on this value, retrain or fallback/fall forward may be initiated if enabled by the %E1 or %E2 commands.

Table E-1. AT Commands

Command	Explanation
	The command reports an ERROR if the modem is not connected, or is connected at 300bps, V.23, or fax modes. In V.34, the symbol rate, SNR, THD, TX level and pre-emphasis are also reported.
AT\Commands \An	Maximum MNP Block Size Setting. This sets the maximum allowable MNP block size. Block size is negotiated during the MNP handshaking. In general, the better the line quality, the larger the blocks. (See S40.) \A0 64 characters. **\A1 128 characters.** \A2 192 characters. \A3 256 characters.
\Bn	Break Command. In reliable mode, the modem will signal a BREAK through the active error correction protocol. In non-error correction mode, the modem will transmit a BREAK signal to the remote modem that is a length n times 100 ms, where n is between 1 and 9 (the default for n is 3). When the modem receives a break from the remote modem, the break is passed as follows: 1) For non-corrected modes, the break length is passed; 2) For error-corrected modes a 300ms break is passed. (See \Kn.)
\Gn	Modem-to-Modem Software Flow Control Setting. This command enables or disables software flow control between the local and remote modem. During a reliable connection, this setting is ignored. (See S41.) \G0 Disable modem-to-modem software flow control. \G1 Enable modem-to-modem software flow control.
\Kn	Break Control Setting. This command allows you to send a BREAK to stop data transfer without disconnecting. (See S40.) The resulting behavior depends on the state of the modem: 1. Modem receives a BREAK from the computer while operating in data mode. \K0 Modem enters on-line command mode. No BREAK is sent to remote modem. \K1 Modem clears data buffers and sends BREAK to remote modem. \K2 Same as \K0. \K3 Sends BREAK to remote modem immediately. \K4 Same as \K0. **\K5 Sends break in sequence with transmitted data.** 2. Modem receives a BREAK from the computer while operating in command mode. (See \B.) \K0 Clears data buffers and sends BREAK to remote modem.

Table E-1. AT Commands

Command	Explanation
	\K1 Same as \K0. \K2 Sends BREAK to remote modem immediately. \K3 Same as \K2. \K4 Sends BREAK to remote modem in sequence with data. **\K5 Same as \K4.** 3. Modem receives BREAK from remote modem during non-error corrected connection: \K0 Clears data buffers and sends BREAK to computer. \K1 Same as \K0. \K2 Sends a BREAK immediately to computer. \K3 Same as \K2. \K4 Sends a BREAK in sequence with received data to computer. **\K5 Same as \K4** 4. Modem receives BREAK from remote modem during reliable connection: the modem passes a 300 ms BREAK to the host.
\Nn	Error correction Mode Setting. This command selects the error correction mode to be negotiated in subsequent connections. (See &Qn, S36, and S48.) \N0 Selects a normal connection. A normal connection is a connection with flow control, but no error correction or data compression. (Equivalent to &Q6.) \N1 Same as &Q0. \N2 Selects a reliable connection (a connection that uses error correction). In this mode the modem will try to establish a V.42 (LAPM) or MNP connection. If the attempt fails, the modem will hang up. (Equivalent to &Q5 S36=4 S48=7.) **\N3 Selects an auto-reliable connection. In this mode the modem will first try to establish a reliable connection. If it fails, it will try to establish a normal connection.** (Equivalent to &Q5 S36=7 S48=7.) \N4 Selects LAPM error correction. If the attempt to make a LAPM connection fails, the modem will hang up the line. -K1 may override this command (Equivalent to &Q5 S48=0.) \N5 Selects MNP error correction. If an attempt to make an MNP connection fails, the modem will hang up the line. (Equivalent to &Q5 S36=4 S48=128.)

Table E-1. AT Commands

Command	Explanation
	\Vn - Single Line Connect Message Enable The Single line connect message format can be enabled or disabled by the Vn command as follows. V0 Connect messages are controlled by the command settings X. W. and S95 V1 Connect messages are displayed in the single line format described below subject to the command settings V (Verbose) and Q (Ouiet). In Non-Verbose mode (V0). single line connect messages are disabled and a single numeric result code is generated for CONNECT DTE. When single line connect messages are enabled there are no CARRIER PROTOCOL or COMPRESSION messages apart from the fields described below. The single line connect message format is: CONNECT <DTE Speed>< Modulation>< Protocol></Compression></Line Speed> <Voice and Data> Where: <DTE Speed = DTE speed e.g.. 57600. Modulation = "V32" for V.32 or V.32bis modulations. "V34" for V.34 modulations. NOTE: Modulation is omitted for all other modulations. Protocol = "NONE" for no protocol. "ALT" for Microcom Network Protocol. "LAPM" for LAP-M protocol. Compression = "CLASS5" for Microcom MNP5 compression. "V42BIS" for V.42bis compression. NOTE: Compression is omitted if protocol is NONE. Line Speed = Asymmetric rates are displayed as /rate:TX/rate:RX, e.g.. /1200 TX/75 RX. Symmetric rates are displayed as a single DCE rate e.g.. 14400. Voice and Data = Blank for Data mode only. "SVD" for AudioSpan analog simultaneous audio/voice and data. "DSVD" for G.729A or DigiTalk digital simultaneous voice and data.

Table E-1. AT Commands

Command	Explanation
AT) Commands)Mn	Cellular Power Level Setting. This command enables or disables the automatic transmit power level adjustment during MNP 10 link negotiation. The @Mn command sets the initial modem transmit level. (See S40.) **)M0 Disable power level adjustment.**)M1 Enable power level adjustment.)M2 Enable power level adjustment during MNP10 link negotiation. After connection, the power level remains fixed.
AT* Commands *Hn	Link Negotiation Speed Setting. This command controls the initial connection speed for MNP 10 link negotiations. (See S28.) ***H0 Link negotiation at highest speed supported.** *H1 Link negotiation at 1200 bps. *H2 Link negotiation at 4800 bps.
**	Download to Flash Memory. A flash programming algorithm must first be loaded into RAM, then the Flash PROM may be loaded. The terminal program must be set to accept hardware and software flow control and should be set to 8 bits, no parity, 1 stop bit. DTE speeds to 115 Kbps are supported. Turn off character and line spacing options. You must have both the Flash loading file and the modem hex code. WARNING: Do not stop once the modem code is loading. The modem will be irreparably damaged. Before attempting this procedure, contact the factory for the latest object code and instructions. Procedure: 1) Issue the AT** command. Response: "Downloading initiated..." 2) Perform an ASCII file transfer of the flash code. Response: "Downloading flash file..." 3) Perform an ASCII file transfer of the modem hex code. Response: "Download successful." 4) Issue the ATZ command.
AT: Commands :En	Compromise Equalizer Setting. By default, the compromise equalizer is turned on. However, with some cellular lines, connections may be more reliable with the compromise equalizer turned off. (See S201.) :E0 Disable equalizer. **:E1 Enable equalizer.**
AT- Commands -Kn	MNP Extended Services Setting. This command enables or disables conversion of a V.42 LAPM connection to an MNP 10 connection. (See S40.) -K0 Disable conversion. **-K1 Enable conversion.** -K2 Enable conversion, except during V.42 LAPM answer detection.
-Qn	V.22bis/V.22 Fallback Setting. This command enables or disables fallback to V.22bis or V.22. (See S41.)

Table E-1. AT Commands

Command	Explanation
	-Q0 Disable fallback so that it is limited to 4800 bps. -Q1 Enable fallback.
-SEC=X,Y	MNP 10EC Cellular Protocol Settings. This command enables or disables MNP 10EC and selects initial transmit level. Saved in nonvolatile memory. X=0 Disable MNP 10EC mode. X=1 Enable MNP 10EC mode. Y=-10 to -30 Initial transmit level in dBm. Overwritten with S91 on factory default.
-SEC?	Display MNP 10EC parameters.
-SDRn	Distinctive Ring. This command permits reporting of distinctive ringing cadences. There are three ring types: 1) 2 seconds on, 4 seconds off; 2) 0.8 seconds on, 0.4 seconds off, 0.8 seconds on, 4.0 seconds off; 3) 0.4 seconds on, 0.2 seconds off, 0.4 seconds on, 0.2 seconds off, 0.8 seconds on, 4.0 seconds off. n=0 Disable distinctive ring. Any valid ring is reported as RING. n=1 Enable Type 1 ring detection (RING1). n=2 Enable Type 2 ring detection (RING2). n=3 Enable Type 1 and Type 2 ring detection. n=4 Enable Type 3 ring detection (RING3). n=5 Enable Type 1 and Type 3 ring detection. n=6 Enable Type 2 and Type 3 ring detection. n=7 Enable Type 1, Type 2, and Type 3 ring detection.
AT+ Commands +MS=X,Y, MINRATE, MAXRATE	Sets protocol, automode, and speed range. Saved in nonvolatile memory. X=0 V.21 X=1 V.22 X=2 V.22bis X=3 V.23 X=9 V.32 X=10 V.32bis X=11 V.34 X=64 B103 X=69 B212 X=74 V.FC Y=0 Fixed mode Y=1 Automode MINRATE and MAXRATE equals one of the following: 300, 600, 1200, 2400, 4800, 7200, 9600, 12000, 14400, 16800, 19200, 24000, 26400, 28800, 31200, 32000, 33600, 34000, 36000, 38000, 40000, 42000, 44000, 46000, 48000, 50000, 52000, 54000, 56000
AT# Commands #CIDn - Caller ID	Enables or disables Caller ID.

Table E-1. AT Commands

Command	Explanation
	#CID=0Disables Caller ID. (Default.) #CID=1Enables Caller ID with formatted presentation to the DTE. The modem will present the data items in a <Tag><Value> pair format. The expected pairs are data, time, caller code (telephone number) and name. #CID=2Enables Caller ID with unformatted presentation to the DTE. The modem will present the entire packet of information excluding the leading U's in ASCII printable hex numbers. Result Codes: OK n = 0 or 2. ERROR Otherwise. **Inquiries** #CID? Retrieves the current Caller ID mode from the modem. #CD=?Returns the mode capabilities of the modem in a list with each element separated by commas. **Formatted Form Reporting** The modem presents the data in the <tag> = <value> pair format as described in the table below. Spaces are present on both sides of the equal sign **Tag** **Description** DATE DATE = MMDD where MM is the month number (01 to 12) and DD is the day number (01..31) TIME TIME = HHMM where HH is the hour number 100 to 23) and MM is the minute number (00 to 59) NMBR NMBR = <number> or P or O where <number> is the telephone number of the caller where P indicates that the calling number information is not available since the originating caller has requested private service. and where O indicates that the calling number information is not available or out of service at the calling location. NAME NAME = <listing name> where <listing name> is the subscription name MESG MESG = <data tag> <length of message> <data> <checksum> in printable ASCII hex numbers. This tag indicates a data item not listed above. The message is only possible for Multiple Message Format.

Table E-1. AT Commands

Command	Explanation
	NOTES: 1. The modem does not present any Caller ID information, if the DCE detects a checksum error in the Caller ID packet. 2. In the event of an unrecognized data tag, the modem will present the data in ASCII hex numbers following the MESG tag. **Example of Formatted Form Reporting** 1. The following example illustrates the standard Caller ID message packet. RING DATE=0 3 2 1 TIME=1 4 0 5 NMBR=5 0 4 5 5 5 1 2 3 4 NAME=A N OTHER RING RING 2. The following example illustrates the case where the tag of the packet is not recognized by the modem. RING MESG = 0 6 0 3 4 2 4 2 4 2 3 2 RING RING **Unformatted Form Reporting** The modem presents all information and packet control information found in the message. The modem however, excludes the leading U's (channel seizure information) from the presentation. The packet is presented in ASCII printable hex numbers. The modem does not insert spaces or line feeds for formatting between bytes or words of the packet. The modem does not detect the checksum of the packet. **Example of Unformatted Form Reporting** RING 2 4 0 0 0 2 32 RING RING

S Registers

Table E-2 shows the S registers supported by the PrecisionBook FAX/modem.

Table E-2. S Registers

Register	Range	Default	Explanation
S0	0-255	0	Rings to Auto-Answer. Sets the number of telephone rings required before the modem automatically answers a call. If S0=0, then auto-answer is disabled. Units: rings In Profile: Yes Writeable: Yes
S1	0-255	0	Ring Counter. Counts the number of telephone rings from an incoming call. The register is set to 0 if it detects no rings for 8 seconds. Units: rings In Profile: No Writeable: No
S2	0-255	43	Escape Character. The default value corresponds to the '+' character. Any value over 127 disables the escape process. Units: ASCII decimal In Profile: Yes Writeable: Yes
S3	0-127	13	Carriage Return Character. Units: ASCII decimal In Profile: No Writeable: Yes
S4	0-127	10	Line Feed Character. Units: ASCII decimal In Profile: No Writeable: Yes
S5	0-32	8	Backspace Character. Units: ASCII decimal In Profile: No Writeable: Yes

Table E-2. S Registers

Register	Range	Default	Explanation
S6	Range: 2-255	Default: 4	Wait Time for Dialtone. Sets the length of time that the modem will wait before dialing. This register is ignored if the X2 or X4 commands have been issued. This register is also ignored when the W dial command modifier has been processed. (See Dn.) Units: seconds
			In Profile: Yes Writeable: Yes
S7	1-255	50	Wait Time for Carrier. Sets the length of time that a) the modem waits for a carrier before hanging up, b) the modem waits for silence when processing the @ dial command modifier, c) the modem waits for a dialtone when processing the W dial command modifier, and d) the modem waits for credit card bong when processing & dial command modifier. (See Dn.) Units: seconds In Profile: Yes Writeable: Yes
S8	2-255	2	Wait Time for Comma Dial Command Modifier. Sets the length of time that the modem pauses when processing the , (comma) dial command modifier. (See Dn.) Units: seconds In Profile: Yes Writeable: Yes
S9	1-255	6	Carrier Detect Response Time. Sets the time that the carrier must be present before the modem considers it valid and turns on carrier detect (CD). Increasing this delay decreases the chance of your modem incorrectly detecting a carrier due to noise on the telephone line. Units: 0.1 seconds In Profile: Yes Writeable: Yes

Table E-2. S Registers

Register	Range	Default	Explanation
S10	1-255	14	Carrier Loss Disconnect Time. Sets the length of time that the modem waits to hang up the line after it detects a loss of carrier. If S10 is set to 255, the modem will not hang up when the carrier is lost. Units: 0.1 seconds In Profile: Yes Writeable: Yes
S11	50-255	95	Touch-tone Duration/Spacing. Sets the tone duration and spacing of touch-tones. Units: 0.001 seconds Default: In Profile: Yes Writeable: Yes
S12	0-255	50 (ONE SECOND)	Escape Code Guard Time. This is the minimum delay required before and after entering the escape sequence +++ and the maximum delay allowed between consecutive + characters within the escape sequence. Units: 0.02 seconds In Profile: Yes Writeable: Yes

Table E-2. S Registers

Register	Range	Default	Explanation
S14		138 (2+8+128)	Bit-Mapped Options. By default the modem is set up to originate calls, use verbose result codes, and to echo commands. In Profile: Yes Writeable: No Bit Value Meaning 0 0 Not used 1 0 Command echo disabled (E0). 2 Command echo enabled (E1). 2 0 Send result codes (Q0). 4 Do not send result codes (Q1). 3 0 Numeric result codes (V0). 8 Verbose result codes (V1). 4 0 Reserved. 5 0 Tone (T). 32 Pulse (P). 6 0 Reserved. 7 0 Answer. 128 Originate.
S16		0	Bit-Mapped Options (Test Mode). By default, all loopback testing is disabled. In Profile: No Writeable: No Bit Value Meaning 0 0 Disable local analog loopback test. 1 Enable local analog loopback test (&T1). 1 0 Not used. 2 0 Disable local digital loopback test. 4 Enable local digital

Table E-2. S Registers

Register	Range	Default	Explanation
			loopback test (&T3). 3 0 Remote digital loopback test off. 8 Remote digital loopback test in progress. 4 0 Disable remote digital loopback test. 16 Enable remote digital loopback test (&T6). 5 0 Disable remote digital loopback with self-test. 32 Enable remote digital loopback with self-test (&T7). 6 0 Disable local analog loopback with self-test. 64 Enable local analog loopback with self-test (&T8).
S18	0-255	0	Test Timer. Sets the duration of the modem diagnostic tests initiated with the &Tn commands. If set to 0, tests will continue until forced to stop by another command, like &T0. Units: seconds In Profile: Yes Writeable: Yes

Table E-2. S Registers

Register	Range	Default	Explanation
S21		52 [4+16+32]	Bit-Mapped Options. In Profile: Yes Writeable: No Bit Value Meaning 0 0 Not used. 1 0 Reserved. 2 0 Clear to send (CTS) always on (&R0). 4 CTS follows request to send (RTS) (&R1). 3, 4 0 Data terminal ready (DTR) behaves according to &D0. 8 DTR behaves according to &D1. 16 DTR behaves according to &D2. 24 DTR behaves according to &D3. 5 0 Carrier detect (CD) always on (&C0).
			32 CD follows state of carrier (&C1). 6 0 Data set ready (DSR) always on (&S0). 64 DSR active after answer tone has been detected (&S1). 7 0 Disable long space disconnect (Y0). 128 Enable long space disconnect (Y1).

Table E-2. S Registers

Register	Range	Default	Explanation
S22		119 (3+4+112)	Bit-Mapped Options (Speaker/Results). By default, the speaker is on at low volume during call establishment, and result codes are limited according to X4. In Profile: Yes Writeable: No Bit / Value / Meaning 0, 1 / 0 / Speaker off (L0). 1 / Low speaker volume (L1). 2 / Low speaker volume (L2). 3 / Low speaker volume (L3). 2, 3 / 0 / Speaker always off (M0) 4 / Speaker on during call establishment only (M1). 8 / Speaker always on (M2). 12 / Speaker on after receiving carrier (M3). 4, 5, 6 / 0 / Limit result codes according to X0. 64 / Limit result codes according to X1. 80 / Limit result codes according to X2. 96 / Limit result codes according to X3. 112Limit result codes according to X4. 7 / 0 / Reserved.
S23		54 (6+48)	Bit-Mapped Options. By default, the modem assumes 2400 bps DTE rate with no parity.

Table E-2. S Registers

Register	Range	Default	Explanation
			Remote digital loopback tests are allowed. In Profile: Yes Writeable: No Bit / Value / Meaning 0 / 0 / Prohibit remote digital loopback (&T5). 0 / 1 / Allow remote digital loopback (&T4). 1, 2, 3 / 0 / 0-300 bps data terminal equipment (DTE) rate. 1, 2, 3 / 2 / 2600 bps DTE rate. 1, 2, 3 / 4 / 41200 bps DTE rate. 1, 2, 3 / 6 / 2400 bps DTE rate. 1, 2, 3 / 8 / 4800 bps DTE rate. 1, 2, 3 / 10 / 9600 bps DTE rate. 1, 2, 3 / 12 / 19200 bps DTE rate. 4, 5 / 0 / Even parity. 4, 5 / 16 / Not used. 4, 5 / 32 / Odd parity. 4, 5 / 48 / No parity. 6, 7 / 0 / No guard tone (&G0). 6, 7 / 64 / No guard tone (&G1). 6, 7 / 128 / 1800 Hz guard tone (&G2).
S24	0-255	10 (in US)	Sleep Inactivity Timer. Sets the length of time that the modem will operate in normal mode with no activity before entering low-power sleep mode. If set to 0, the low-power sleep mode is disabled. Units: seconds In Profile: Yes Writeable: Yes
S25	0-255	5	DTR Drop Detect Delay. Sets the length of time that the modem will ignore a DTR drop before hanging up. Units: 0.01 seconds In Profile: No Writeable: Yes

Table E-2. S Registers

Register	Range	Default	Explanation
S26	0-255	1	RTS to CTS Delay. Sets the length of time before the modem will respond to RTS with CTS. Units: 0.01 seconds In Profile: Yes Writeable: Yes
S27		9	Bit-Mapped Options. In Profile: Yes Writeable: No Bit — Value — Meaning 0, 1, 3 — 0 — Direct asynchronous mode connection (&M0 or &Q0). 8 — AutoSync (&Q4) 9 — Reliable asynchronous mode connection (&Q5). 10 — Normal asynchronous mode connection (&Q6 or \N0).
			2, 4, 5 — 0 — Reserved. 6 — 0 — Select CCITT mode (B0). 64 — Select Bell mode (B1). 7 — 0 — Reserved.
S28		0	Bit-Mapped Options. In Profile: Yes Writeable: No Bit — Value — Meaning 0, 1, 2, 3, 4, 5 — 0 — Reserved. 6, 7 — 0 — MNP 10 link negotiation at highest speed (*H0). 64 — MNP 10 link negotiation at 1200 bps (*H1). 128 — MNP 10 link negotiation at 4800 bps (*H2).

Table E-2. S Registers

Register	Range	Default	Explanation
S29	0-255	0	Flash Dial Modifier Time. Sets the length of time that the modem will go on-hook when processing the ! dial command modifier. (See Dn.) Units: 0.01 seconds In Profile: No Writeable: No
S30	0-255	0	Disconnect Inactivity Timer. Sets the length of time that the modem waits before disconnecting when no data is sent or received. When set to 0, the disconnect inactivity timer is disabled. Units: 10 seconds In Profile: No Writeable: Yes
S31		194 (2+192)	Bit-Mapped Options. In Profile: Yes Writeable: No Bit 0 Value 0 Meaning: Single line connect message (\Vn) Bit 1 Value 0: Disable automatic line speed detection (N0). Value 2: Enable automatic line speed detection (N1). Bit 2, 3 Value 0: Report DTE rate connection message only (W0). Value 4: Full reporting of connection messages (W1). Value 8: Report DCE rate connection message only (W2). Bit 4, 5 Value 0: Reserved. Bit 6, 7 Value 192: Restricted.
S32	0-255	17	XON Character. Units: ASCII decimal In Profile: No Writeable: Yes
S33	0-255	19	XOFF Character. Units: ASCII decimal In Profile: No Writeable: Yes

Table E-2. S Registers

Register	Range	Default	Explanation
S36		7	Bit-Mapped Options (V.42 Control after LAPM Failure). This register specifies the behavior of the modem upon failure of the LAPM error-correction protocol. In Profile: Yes Writeable: Yes Bit 0, 1, 2: 0 Modem disconnects if connection fails. 1 Direct connection is established. 2 Reserved. 3 Normal connection is established. 4 MNP connection is attempted and, if it fails, modem disconnects. 5 MNP connection is attempted and if it fails, a direct connection is established. 6 Reserved. 7 MNP connection is attempted and if it fails, a normal connection is established. Bit 3, 4, 5, 6, 7: 0 Reserved.

Table E-2. S Registers

Register	Range	Default	Explanation
S37	0-12, 15-21	0	Line Speed. (See also Nn.) In Profile: Yes Writeable: Yes 0 Automatic line speed detection (N1). 1 300 bps. 2 300 bps. 3 300 bps. 4 Reserved. 5 1200 bps. 6 2400 bps (V.22bis). 7 V.23. 8 4800 bps (V.32bis/V.32). 9 9600 bps (V.32bis/V.32). 10 12000 bps (V.32bis). 11 14400 bps (V.32bis). 12 7200 bps (V.32bis). 15 14400 bps (V.34) 16 16800 bps (V.34) 17 19200 bps (V.34) 18 21600 bps (V.34) 19 24000 bps (V.34) 20 26400 bps (V.34) 21 28800 bps (V.34)
S38	0-255	20	Delay Before Force Hang-up. Sets the length of time that your modem waits after receiving an H0 command (or a DTR drop if your modem is set to follow DTR) before it hangs up. An OK message indicates that all data was transmitted before disconnecting. A NO CARRIER message indicates that the timer expired
			before all the data was sent. If S38 is set to 255, then the modem will stay connected until all the data in its buffer is delivered or the connection is lost. Units: seconds In Profile: No Writeable: Yes

Table E-2. S Registers

Register	Range	Default	Explanation
S39		3	Bit-Mapped Options (Flow Control). In Profile: Yes Writeable: No Bit / Value / Meaning 0, 1, 2 / 0 / Disable flow control (&K0). 3 / Hardware flow control (&K3). 4 / Software flow control (&K4). 5 / Transparent software flow control (&K5). 6 / Both hardware and software flow control (&K6). 3, 4, 5, 6, 7 / 0 / Reserved.
S40		168 (40+128)	Bit-Mapped Options. By default, the MNP block is 128 characters, break control is set according to \K5, and MNP extended services are set according to -K1. In Profile: Yes Writeable: No Bit / Value / Meaning 0, 1 / 0 / Disable according to -K0. 1 / Enable according to -K1. 2Enable according to -K2. 2 / 0 / Automatic cellular power level adjustment ( )M0). 4 / Forced cellular power level adjustment ()M1). 3, 4, 5 / 0 / Break control according to \K0. 8 / Break control according to \K1. 16 / Break control according to \K2.

Table E-2. S Registers

Register	Range	Default	Explanation		
				24	Break control according to \K3.
				32	Break control according to \K4.
				40	Break control according to \K5.
			6, 7	0	64 character MNP block size (\A0).
				64	128 character MNP block size (\A1).
				128	192 character MNP block size (\A2).
				192	256 character MNP block size (\A3).

Table E-2. S Registers

Register	Range	Default	Explanation
S41		195 (3+64+128)	Bit-Mapped Options. In Profile: Yes Writeable: No Bit 0, 1 Value 0 Meaning: Disable compression (%C0). Value 1: MNP 5 compression (%C1). Value 2: V.42bis compression (%C2). Value 3: V.42bis and MNP5 compression (%C3). Bit 2, 6 Value 0: Disable line quality monitor (%E0). Value 4: Enable line quality monitor with auto-retrain (%E1). Value 64: Enable line quality monitor with fallback/ fall forward (%E2). Bit 3 Value 0: Disable received data software control (\G0). Value 8: Enable received data software contro(\G1). Bit 4 Value 0: Use MNP stream mode control (\L0). Value 16: Use MNP block mode control (\L1). Bit 5 Value 0: Reserved. Bit 7 Value 0: Disable fallback from MNP 10 to V.22bis/V.22 (-Q0). Value 128: Enable fallback from MNP 10 to V.22bis/V.22 (-Q1).
S46	136 or 138	138	Data Compression Control. In Profile: Yes Writeable: Yes 136 Disable compression. 138 Enable compression.

Table E-2. S Registers

Register	Range	Default	Explanation
S48	0, 7, 128	7	V.42 Error Correction Negotiation. In Profile: Yes Writeable: Yes 0 Disable negotiation and proceed with LAPM. 7 Enable negotiation. 128 Disable negotiation and proceed once with fallback option in S36. Use this setting to force MNP error correction.
S82	3, 7, 128	128	LAPM Break Control. In Profile: No Writeable: Yes 3 BREAK is sent immediately. Data integrity is maintained. 7 BREAK is sent immediately. Data is destroyed. 128 BREAK is sent in sequence with transmitted data. Data integrity is maintained.
S86	0-14	None	Connection Failure Reason Code. In Profile: No Writeable: No When a connection fails and the modem sends NO CARRIER, this register will contain the reason for failure. This register is read-only. 0 Normal disconnect. 4 Loss of carrier. 5 V.42 negotiation failed with remote modem. 6 No response to feature negotiation. 7 This modem is asynchronous but the remote modem is synchronous. 9 Modems could not find a common protocol. 10 Bad response to feature negotiation. 12 Normal disconnect initiated by remote modem.
			13 Remote modem does not respond after 10 attempts. 14 Protocol violation.

Table E-2. S Registers

Register	Range	Default	Explanation
S95		0	Bit-Mapped Options (Result Code Message Control). In Profile: Yes Writeable: Yes Bit / Value / Meaning 0 / 0 / CONNECT nnnn result code indicates DTE rate. 0 / 1 / CONNECT nnnn result code indicates DCE rate instead of DTE rate. 1 / 0 / Standard CONNECT nnnn result code enabled. 1 / 2 / /ARQ appended to CONNECT nnnn result code in error correction mode. 2 / 0 / Disable CARRIER nnnn result code. 2 / 4 / Enable CARRIER nnnn result code. 3 / 0 / Disable PROTOCOL nnnn result code. 3 / 8 / Enable PROTOCOL nnnn result code. 4 / 0 / Reserved. 5 / 0 / Disable COMPRESSION nnnn result code. 5 / 32 / Enable COMPRESSION nnnn result code. 6, 7 / 0 / Reserved.

Table E-2. S Registers

Register	Range	Default	Explanation
S201	0-255	50 (18+32)	Bit-Mapped Options (Cellular Transmit Level). Units: ASCII decimal In Profile: Yes Writeable: Yes Bit Value Meaning 0-5 18 Initial power setting
			determined by @Mn. 5 0 Disable compromise equalizer (:E0) 32 Enable compromise equalizer (:E1) 6 0 Reserved. 7 0 MNP 10EC mode off. 128 MNP 10EC mode on.
S210	0-255	13 (5+8)	Bit-Mapped Options (Symbol Rates and Asymmetric Rate Select). Units: ASCII decimal In Profile: Yes Writeable: Yes Bit Value Meaning 0-2 0 2400 1 2400 2 2400, 2800 3 2400, 2800, 3000 4 2400, 2800, 3000, 3200 5 2400, 2800, 3000, 3200, 3429 0 V.34 Asymmetric Disabled 8 V.34 Asymmetric Enabled

Modem Responses

Table E-3 shows the responses supported by the PrecisionBook FAX/modem.

Table E-3. Responses

Word Response	Numeric Response	Explanation
OK	00	Command executed.
CONNECT	01	Connection established.
RING	02	Ring is detected.
NO CARRIER	03	Modem hangs up because: a carrier is not detected, carrier is lost, or carrier has been inactive for the period of time set in the S30 register.
ERROR	04	Invalid command
CONNECT	05	CONNECT for X0.
NO DIALTONE	06	Did not receive expected dialtone. ERROR for X0 and X1.
BUSY	07	Detected a busy signal on the line. ERROR for X0, X1, and X2.
NO ANSWER	08	A continuous ringing signal is detected on the line when attempting to originate a call. The value in S7 determines how long the modem will wait for an answer.
CONNECT 600	09	600 bps.
CONNECT 2400	10	2400 bps.
CONNECT 4800	11	4800 bps DTE rate.
CONNECT 9600	12	9600 bps DTE rate.
CONNECT 7200	13	7200 bps DTE rate.
CONNECT 12000	14	12000 bps DTE rate.
CONNECT 14400	15	14400 bps DTE rate.
CONNECT 19200	16	19200 bps DTE rate.
CONNECT 38400	17	38400 bps DTE rate.
CONNECT 57600	18	57600 bps DTE rate.
CONNECT 115200	19	115200 bps DTE rate.
CONNECT 75TX/1200RX	22	V.23 originate connection.
CONNECT 1200TX/75RX	23	V.23 answer connection.

Table E-3. Responses

Word Response	Numeric Response	Explanation
DELAYED	24	Delayed by blacklisting. ERROR for X0, X1, and X3.
BLACKLISTED	32	Blocked by blacklisting. ERROR for X0, X1, and X3.
FAX	33	Connection established in fax mode.
+FCERROR	34	Error in FAX mode
DATA	35	Connection established in data mode.
CARRIER300	40	300 bps DCE rate.
CARRIER 600	42	600 bps DCE rate.
CARRIER 1200/75	44	V.23 backward channel carrier detected.
CARRIER 75/1200	45	V.23 forward channel carrier detected.
CARRIER 1200	46	1200 bps DCE rate.
CARRIER 2400	47	2400 bps DCE rate.
CARRIER 4800	48	4800 bps DCE rate.
CARRIER 7200	49	7200 bps DCE rate.
CARRIER 9600	50	9600 bps DCE rate.
CARRIER 12000	51	12000 bps DCE rate.
CARRIER 14400	52	14400 bps DCE rate.
CARRIER 16800	53	16800 bps DCE rate.
CARRIER 19200	54	19200 bps DCE rate.
CARRIER 21600	55	21600 bps DCE rate.
CARRIER 24000	56	24000 bps DCE rate.
CARRIER 26400	57	26400 bps DCE rate.
CARRIER 28800	58	28800 bps DCE rate.
CONNECT 16800	59	16800 bps DTE rate.
CONNECT 19200	60	19200 bps DTE rate.
CONNECT 21600	61	21600 bps DTE rate.
CONNECT 24000	62	24000 bps DTE rate.
CONNECT 26400	63	26400 bps DTE rate.
CONNECT 28800	64	28800 bps DTE rate.
COMPRESSION: CLASS 5	66	Connected with MNP 5 compression.
COMPRESSION: V.42	67	Connected with V.42 compression.

Table E-3. Responses

Word Response	Numeric Response	Explanation
COMPRESSION: NONE	69	Connected with no data compression.
PROTOCOL: NONE	70	Connected with no error correction.
PROTOCOL: LAPM	77	Connected with V.42bis LAPM error correction.
CARRIER 31200	78	31200 bps DCE rate.
CARRIER 33600	79	33600 bps DCE rate.
PROTOCOL: ALT	80	Connected with MNP 2, 3, or 4 error correction.
PROTOCOL:ALT-CELLULR	81	Connected with MNP 10EC.
CONNECT 33600	84	33600 bps DTE rate.
CONNECT 31200	91	31200 bps DCE Rate
CARRIER 32000	150	32000 bps DCE Rate
CARRIER 34000	151	34000 bps DCE Rate
CARRIER 36000	152	36000 bps DCE Rate
CARRIER 38000	153	38000 bps DCE Rate
CARRIER 40000	154	40000 bps DCE Rate
CARRIER 42000	155	42000 bps DCE Rate
CARRIER 44000	156	44000 bps DCE Rate
CARRIER 46000	157	46000 bps DCE Rate
CARRIER 48000	158	48000 bps DCE Rate
CARRIER 50000	159	50000 bps DCE Rate
CARRIER 52000	160	52000 bps DCE Rate
CARRIER 54000	161	54000 bps DCE Rate
CARRIER 56000	162	56000 bps DCE Rate
CONNECT 32000	165	32000 bps DCE Rate
CONNECT 34000	166	34000 bps DCE Rate
CONNECT 36000	167	36000 bps DCE Rate
CONNECT 38000	168	38000 bps DCE Rate
CONNECT 40000	169	40000 bps DCE Rate
CONNECT 42000	170	42000 bps DCE Rate
CONNECT 44000	171	44000 bps DCE Rate
CONNECT 46000	172	46000 bps DCE Rate
CONNECT 48000	173	48000 bps DCE Rate
CONNECT 50000	174	50000 bps DCE Rate

Table E-3. Responses

Word Response	Numeric Response	Explanation
CONNECT 52000	175	52000 bps DCE Rate
CONNECT 54000	176	54000 bps DCE Rate
CONNECT 56000	177	56000 bps DCE Rate
+F4	+F4ERROR	Error detected in fax mode.

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