## NAME

**INSTALL** – Installation procedure for NetBSD/pc532

## DESCRIPTION

### About this Document

This document describes the installation procedure for NetBSD 1.4 on the *pc532* platform. It is available in four different formats titled `INSTALL.`*ext*, where *ext* is one of `.ps`, `.html`, `.more`, or `.txt`.

`.ps` PostScript.

`.html` Standard internet HTML.

`.more` The enhanced text format used on Unix-like systems by the `more`(1) and `less`(1) pager utility programs. This is the format in which the on-line *man* pages are generally presented.

`.txt` Plain old ASCII.

You are reading the *PostScript* version.

### What is NetBSD?

The NetBSD Operating System is a fully functional Open Source UN∗X-like operating system derived from the Berkeley Networking Release 2 (Net/2), 4.4BSD-Lite, and 4.4BSD-Lite2 sources. NetBSD runs on twenty different system architectures featuring eight distinct families of CPUs, and is being ported to more. The NetBSD 1.4 release contains complete binary releases for fourteen different machine types. (The six remaining are not fully supported at this time and are thus not part of the binary distribution. For information on them, please see the NetBSD web site at **http://www.netbsd.org/**)

NetBSD is a completely integrated system. In addition to its highly portable, high performance kernel, NetBSD features a complete set of user utilities, compilers for several languages, The X Window System, and numerous other tools, all accompanied by full source code.

NetBSD is a creation of the members of the Internet community. Without the unique cooperation and coordination the net makes possible, it's likely that NetBSD wouldn't exist.

### Changes Since The Last Release

The NetBSD 1.4 release is a substantial improvement over its predecessors. We have provided numerous significant functional enhancements, including support for many new devices, integration of hundreds of bug fixes, new and updated kernel subsystems, and many userland enhancements. The results of these improvements is a stable operating system fit for production use that rivals most commercially available systems.

It is impossible to completely summarize the nearly two years of development that went into the NetBSD 1.4 release. Some highlights include:

- Substantial improvements in the TCP/IP implementation, including numerous performance enhancements and bug fixes by Jason Thorpe and others.
- A new, high efficiency kernel memory pool allocator by Paul Kranenburg. This has been integrated into most kernel subsystems.
- A new, totally rewritten virtual memory subsystem, UVM, created by Chuck Cranor, which is substantially cleaner and better performing than the old Mach derived VM subsystem.
- Improved POSIX and XPG standards compliance.

- Completion of the integration of all remaining 4.4BSD Lite-2 kernel improvements and bug fixes that had not been previously integrated. (Integration of all userland components was completed before NetBSD 1.3)
- Several new ports, including macppc, bebox, sparc64, next68k, and others, have been integrated into the source tree.
- The system compilers have been upgraded to egcs 1.1.1, and the system compiler toolchain now (mostly) uses the latest versions of GNU binutils instead of the obsolete versions left over from 4.4BSD Lite.
- Everyone's favorite `ftp`(1) client has been improved even further. See the man page for details.
- A new architecture independent console driver, `wscons`(4), has been integrated into many ports.
- Numerous improvements have been made to the audio subsystem support, including support for MIDI device drivers.
- Linux compatibility support has been improved.
- A number of scheduler enhancements have yielded dramatic improvements in interactive performance and better control of background tasks.
- Several network tunneling protocols, including GRE and IP in IP, have been implemented.
- Kernel support for the CODA distributed file system has been added.
- Manuel Bouyer completed major changes to the IDE support. It is now architecture independent. Major changes have been made to the IDE code for better error handling, improved ATAPI support, 32 bit data I/O support and bus-master DMA support on PCI IDE controllers.
- Lennart Augustsson has added full USB support, permitting the use of a wide variety of Universal Serial Bus peripherals. The drivers should easily port to any future platforms that support the PCI bus. See `usb`(4) for an overview.
- RAIDframe, version 1.1, from the Parallel Data Laboratory at Carnegie Mellon University, has been integrated. Supports RAID levels 0, 1, 4, 5, and more.
- Luke Mewburn added `nsswitch.conf`(5) functionality to the system to specify the search order for system databases.
- `syslogd`(8) now supports listening on multiple sockets, to make the chrooting of servers easier.
- Most third party packages have been updated to the latest stable release.

As has been noted, there have also been innumerable bug fixes.

Kernel interfaces have continued to be refined, and more subsystems and device drivers are shared among the different ports. You can look for this trend to continue.

For the pc532 port, there are a few known problems. They include:

1. ppp reports a lot of input errors on some machines.
2. Some tape drives do not work very well. Some have hung the system.
3. The serial drivers do not have all the desired features. (ttyflags is the most glaring omission.)

**The Future of NetBSD**

The NetBSD Foundation has been incorporated as a non-profit organization. Its purpose is to encourage, foster and promote the free exchange of computer software, namely the NetBSD Operating System. The foundation will allow for many things to be handled more smoothly than could be done with our previous informal organization. In particular, it provides the framework to deal with other parties that wish to become involved in the NetBSD Project.

The NetBSD Foundation will help improve the quality of NetBSD by:

- providing better organization to keep track of development efforts, including co-ordination with groups working in related fields.
- providing a framework to receive donations of goods and services and to own the resources necessary to run the NetBSD Project.
- providing a better position from which to undertake promotional activities.
- periodically organizing workshops for developers and other interested people to discuss ongoing work.

We intend to begin narrowing the time delay between releases. Our ambition is to provide a full release every six to eight months.

We hope to support even *more* hardware in the future, and we have a rather large number of other ideas about what can be done to improve NetBSD.

We intend to continue our current practice of making the NetBSD-current development source available on a daily basis. In addition, we intend to provide Anonymous CVS access to the NetBSD source tree in the near future, so that anyone on the internet can examine the full NetBSD source code repository.

We intend to integrate free, positive changes from whatever sources submit them, providing that they are well thought-out and increase the usability of the system.

Above all, we hope to create a stable and accessible system, and to be responsive to the needs and desires of NetBSD users, because it is for and because of them that NetBSD exists.

## Sources of NetBSD

*NetBSD Mirror Site List*

The following sites mirror NetBSD as of April 03, 1999.

If you wish to become a distribution site for NetBSD, contact `mirrors@netbsd.org`.

FTP mirrors

Australia

ftp.au.netbsd.org
RMIT University, Melbourne
ftp://ftp.au.netbsd.org/pub/NetBSD/

ftp2.au.netbsd.org
University of Queensland, Brisbane
ftp://ftp2.au.netbsd.org/pub/NetBSD/

Austria

ftp.at.netbsd.org
University of Technology, Vienna
ftp://ftp.at.netbsd.org/pub/NetBSD/

Brazil

ftp.ravel.ufrj.br
Cidade Universitaria
ftp://ftp.ravel.ufrj.br/pub/NetBSD/

Denmark

ftp.dk.netbsd.org
Aalborg University
ftp://ftp.dk.netbsd.org/pub/NetBSD/

Finland

ftp.fi.netbsd.org
The Finnish University and Research Network, Espoo
ftp://ftp.fi.netbsd.org/pub/NetBSD/

France

ftp.fr.netbsd.org
Paris University
ftp://ftp.fr.netbsd.org/pub/NetBSD/

Germany

ftp.de.netbsd.org
University of Trier
ftp://ftp.de.netbsd.org/pub/NetBSD/

ftp2.de.netbsd.org
University of Erlangen-Nuremberg
ftp://ftp2.de.netbsd.org/pub/NetBSD/

ftp.uni-regensburg.de
University of Regensburg
ftp://ftp.uni-regensburg.de/pub/comp/os/NetBSD/

Japan

ftp.jp.netbsd.org
Internet Research Institute Inc., Tokyo
ftp://ftp.jp.netbsd.org/pub/NetBSD/

core.ring.gr.jp
Electrotechnical Laboratory
ftp://core.ring.gr.jp/pub/NetBSD/

ftp.dti.ad.jp
Dream Train Internet Inc., Tokyo
ftp://ftp.dti.ad.jp/pub/NetBSD/

mirror.nucba.ac.jp
Nagoya University of Commerce and Business
ftp://mirror.nucba.ac.jp/mirror/NetBSD/

netbsd.tohoku.ac.jp
Tohoku University, Sendai
ftp://netbsd.tohoku.ac.jp/NetBSD/

ring.asahi-net.or.jp
ASAHI Net
ftp://ring.asahi-net.or.jp/pub/NetBSD/

Netherlands

ftp.nl.netbsd.org
University of Amsterdam
ftp://ftp.nl.netbsd.org/pub/NetBSD/

Norway

ftp.no.netbsd.org
Bergen IT Consult AS
ftp://ftp.no.netbsd.org/pub/NetBSD/

ftp.ntnu.no
Norwegian University of Science and Technology
ftp://ftp.ntnu.no/pub/NetBSD/

Russia

ftp.ru.netbsd.org
Landau Institute for Theoretical Physics, Chernogolovka
ftp://ftp.ru.netbsd.org/pub/NetBSD/

Sweden

ftp.stacken.kth.se
Royal Institute of Technology, Stockholm
ftp://ftp.stacken.kth.se/pub/OS/NetBSD/

ftp.sunet.se
Swedish University NETwork, Uppsala
ftp://ftp.sunet.se/pub/os/NetBSD/

UK

ftp.uk.netbsd.org
Domino, London
ftp://ftp.uk.netbsd.org/pub/NetBSD/

sunsite.org.uk
ftp://sunsite.org.uk/packages/netbsd/

USA

ftp.netbsd.org
Silicon Valley, California
ftp://ftp.netbsd.org/pub/NetBSD/

ftp.cs.umn.edu
University of Minnesota
ftp://ftp.cs.umn.edu/pub/NetBSD

ftp.eecs.umich.edu
University of Michigan, Ann Arbor
ftp://ftp.eecs.umich.edu/pub/NetBSD/

ftp.iastate.edu
Iowa State University
ftp://ftp.iastate.edu/pub/netbsd/

ftp.op.net
ftp://ftp.op.net/pub/NetBSD/

AFS mirrors

Sweden

ftp.stacken.kth.se
Royal Institute of Technology, Stockholm
AFS path: /afs/stacken.kth.se/ftp/pub/OS/NetBSD

USA

ftp.iastate.edu
Iowa State University
AFS path: /afs/iastate.edu/public/ftp/pub/netbsd

NFS mirrors

UK

sunsite.org.uk
Instructions: mount -o ro sunsite.org.uk:/public/packages/netbsd /mnt

SUP mirrors

Australia

sup.au.netbsd.org
RMIT University, Melbourne
Instructions: ftp://sup.au.netbsd.org/pub/NetBSD/sup/README.sup

France

sup.fr.netbsd.org
Paris University
Instructions: Similar to sup.netbsd.org

Germany

sup.de.netbsd.org
University of Trier
Instructions: ftp://sup.de.netbsd.org/pub/NetBSD/sup/supfile.example

Japan

sup.jp.netbsd.org
Internet Research Institute Inc., Tokyo
Instructions: ftp://sup.jp.netbsd.org/pub/NetBSD/sup/README.sup

Norway

sup.no.netbsd.org
Norwegian University of Science and Technology
Instructions: See /usr/src/share/examples/supfiles/sup.no.netbsd.org

UK

sup.uk.netbsd.org
Domino, London

Instructions: See ftp://ftp.netbsd.org/pub/NetBSD/sup/README.sup

USA

sup.netbsd.org
Silicon Valley, California
Instructions: See ftp://ftp.netbsd.org/pub/NetBSD/sup/README.sup

ftp.cs.umn.edu
University of Minnesota
Instructions: hostbase=/ftp/ftp/packages/NetBSD, collections are the same as on sup.NetBSD.ORG

WWW mirrors

Australia

www.au.netbsd.org
RMIT University, Melbourne
http://www.au.netbsd.org/

Austria

www.at.netbsd.org
University of Technology, Vienna
http://www.at.netbsd.org/

Finland

www.fi.netbsd.org
Global Wire Oy, Lappeenranta
http://www.fi.netbsd.org/

France

www.fr.netbsd.org
Paris University
http://www.fr.netbsd.org/

Germany

www.de.netbsd.org
http://www.de.netbsd.org/

Japan

www.jp.netbsd.org
Internet Research Institute Inc., Tokyo
http://www.jp.netbsd.org/

Norway

www.no.netbsd.org
Bergen IT Consult AS
http://www.no.netbsd.org/

USA

www.netbsd.org
Western Washington State University
http://www.netbsd.org/

www2.us.netbsd.org
New York
http://www.us.netbsd.org/

### NetBSD 1.4 Release Contents

The root directory of the NetBSD 1.4 release is organized as follows:

`.../NetBSD-1.4/`

| | |
|---|---|
| `BUGS` | Known bugs list (somewhat incomplete and out of date). |
| `CHANGES` | Changes since earlier NetBSD releases. |
| `LAST_MINUTE` | Last minute changes. |
| `MIRRORS` | A list of sites that mirror the NetBSD 1.4 distribution. |
| `README.files` | README describing the distribution's contents. |
| `TODO` | NetBSD's todo list (also somewhat incomplete and out of date). |
| `patches/` | Post-release source code patches. |
| `source/` | Source distribution sets; see below. |

In addition to the files and directories listed above, there is one directory per architecture, for each of the architectures for which NetBSD 1.4 has a binary distribution. There are also 'README.export-control' files sprinkled liberally throughout the distribution tree, which point out that there are some portions of the distribution (i.e. the 'domestic' portion) that may be subject to export regulations of the United States. It is your responsibility to determine whether or not it is legal for you to export these portions and to act accordingly.

The source distribution sets can be found in subdirectories of the "source" subdirectory of the distribution tree. They contain the complete sources to the system. The source distribution sets are as follows:

| | |
|---|---|
| secrsrc.tgz: | This set contains the "domestic" sources. These sources may be subject to United States export regulations.<br>*421K gzipped, 2M uncompressed* |
| gnusrc.tgz: | This set contains the "gnu" sources, including the source for the compiler, assembler, groff, and the other GNU utilities in the binary distribution sets.<br>*19M gzipped, 84.2M uncompressed* |
| syssrc.tgz: | This set contains the sources to the NetBSD 1.4 kernel, config(8), and dbsym(8).<br>*13.5M gzipped, 66.7M uncompressed* |
| sharesrc.tgz: | This set contains the "share" sources, which include the sources for the man pages not associated with any particular program, the sources for the typesettable document set, the dictionaries, and more.<br>*3M gzipped, 11.9M uncompressed* |
| src.tgz: | This set contains all of the NetBSD 1.4 sources which are not mentioned above.<br>*16.1M gzipped, 73.6M uncompressed* |

Most of the above source sets are located in the `source/sets` subdirectory of the distribution tree. The secrsrc.tgz set is contained in the `source/security` subdirectory. This set, which is available only to users in the United States and Canada, contains the sources normally found in `/usr/src/domestic` – primarily kerberos and other cryptographic security related software. (Remember, because of United States law, it may not be legal to distribute this set to locations outside of the United States and Canada.)

The source sets are distributed as compressed tar files. They may be unpacked into `/usr/src` with the command:

**`cat set_name.tgz | gunzip | (cd /; tar xpf - )`**

The `sets/Split/` and `security/Split/` subdirectories contain split versions of the source sets for those users who need to load the source sets from floppy or otherwise need a split distribution. The split sets are are named "set_name.xx" where "set_name" is the distribution set name, and "xx" is the sequence number of the file, starting with "aa" for the first file in the distribution set, then "ab" for the next, and so on. All of these files except the last one of each set should be exactly 240,640 bytes long. (The last file is just long enough to contain the remainder of the data for that distribution set.)

The split distributions may be reassembled and extracted with **`cat`** as follows:

**`cat set_name.?? | gunzip | (cd /; tar xpf - )`**

In each of the source distribution set directories, there is a file named `CKSUMS` which contains the checksums of the files in that directory, as generated by the `cksum`(1) utility. You can use cksum to check the integrity of the archives, if you suspect that one of the files is corrupt and have access to a cksum binary. Checksums based on other algorithms may also be present – see the `release`(7) man page for details.

*NetBSD/pc532 Subdirectory Structure*

The pc532-specific portion of the NetBSD 1.4 release is found in the `pc532` subdirectory of the distribution: `.../NetBSD-1.4/pc532/`

`INSTALL.html`
`INSTALL.ps`
`INSTALL.txt`
`INSTALL.more` Installation notes; this file. The `.more` file contains underlined text using the `more`(1) conventions for indicating italic and bold display.

`binary/`
- `sets/` pc532 binary distribution sets; see below.
- `security/` pc532 security distribution; see below.

`installation/`
- `floppy/`
  - `floppy-144.fs.gz` Installation file system obtained via SCSI floppy or download to RAM.
- `misc/`
  - `download.c.gz` Source for the program to download inst-11.fs into memory via the pc532 ROM monitor.

*Binary Distribution Sets*

The NetBSD pc532 binary distribution sets contain the binaries which comprise the NetBSD 1.4 release for the pc532. There are eight binary distribution sets. The binary distribution sets can be found in the `pc532/binary/sets` subdirectory of the NetBSD 1.4 distribution tree, and are as follows:

**base** The NetBSD 1.4 pc532 **base** binary distribution. You *must* install this distribution set. It contains the base NetBSD utilities that are necessary for the system to run and be minimally functional. It includes shared library support, and excludes everything described below.
*10.4M gzipped, 26.2M uncompressed*

**comp** Things needed for compiling programs. This set includes the system include files (`/usr/include`) and the various system libraries (except the shared libraries, which are included as part of the **base** set). This set also includes the manual pages for all of the utilities it contains, as well as the system call and library manual pages.
*8.3M gzipped, 27.5M uncompressed*

**etc** This distribution set contains the system configuration files that reside in `/etc` and in several other places. This set *must* be installed if you are installing the system from scratch, but should *not* be used if you are upgrading. (If you are upgrading, it's recommended that you get a copy of this set and *carefully* upgrade your configuration files by hand.)
*56K gzipped, 330K uncompressed*

**games** This set includes the games and their manual pages.
*2.8M gzipped, 6.8M uncompressed*

**kern** This set contains a NetBSD/pc532 1.4 GENERIC kernel, named `/netbsd`. You *must* install this distribution set.
*457k gzipped, 910k uncompressed*

**man** This set includes all of the manual pages for the binaries and other software contained in the **base** set. Note that it does not include any of the manual pages that are included in the other sets.
*4.1M gzipped, 16.8M uncompressed*

**misc** This set includes the (rather large) system dictionaries, the typesettable document set, and other files from `/usr/share`.
*2.2M gzipped, 8.5M uncompressed*

**text** This set includes NetBSD's text processing tools, including `groff`(1), all related programs, and their manual pages.
*1.3M gzipped, 4.4M uncompressed*

The pc532 distribution set does not include a security distribution. If you are in the US and want the security distribution you must get the security source distribution and recompile libcrypt.a and recompile the following programs: `ed`(1), `ftpd`(8), `makekey`(8), `rexecd`(8), `uucpd`(8), `init`(8), `lock`(1), `login`(1), `passwd`(1), `skeyinit`(1), `su`(1), `tn3270`(1), and `pppd`(8).

NetBSD maintains its own set of sources for the X Window System in order to assure tight integration and compatibility. These sources are based on XFree86, and tightly track XFree86 releases. They are currently equivalent to XFree86 3.3.3.1. Binary sets for the X Window system are distributed with NetBSD. The sets are:

**xbase** The basic files needed for a complete X client environment. This does not include the X servers.

**xcomp** The extra libraries and include files needed to compile X source code.

**xcontrib** Programs that were contributed to X.

**xfont** Fonts needed by X.

The pc532 binary distribution sets are distributed as gzipped tar files named with the extension **.tgz**, e.g. `base.tgz`.

The instructions given for extracting the source sets work equally well for the binary sets, but it is worth noting that if you use that method, the files are /-relative and therefore are extracted *below* the current directory. That is, if you want to extract the binaries into your system, i.e. replace the system binaries with them, you have to run the **`tar xfp`** command from /.

The initial installation process on a pc532 without a previous NetBSD installation is supported by the following files:

`floppy-144.fs` A file system containing the boot loader and install kernel with a 2MB root.

`download.c` The source for a program to download `inst-11.fs` into memory via the pc532 ROM monitor.

The upgrade process is supported by having a copy of a 1.4 kernel available. This file is:

`kern.tgz` Contains a kernel produced from the `DEFAULT` configuration file in `pc532/conf`.

*Note* Each directory in the pc532 binary distribution also has its own checksum files, just as the source distribution does:

All BSDSUM files are historic BSD checksums for the various files in that directory, in the format produced by the command: **`cksum -o 1`** *`file`*

All CKSUM files are POSIX checksums for the various files in that directory, in the format produced by the command: **`cksum`** *`file`*.

All MD5 files are MD5 digests for the various files in that directory, in the format produced by the command: **`cksum -m`** *`file`*.

All SYSVSUM files are historic AT&T System V UNIX checksums for the various files in that directory, in the format produced by the command: **`cksum -o -2`** *`file`*.

The MD5 digest is the safest checksum, followed by the POSIX checksum. The other two checksums are provided only to ensure that the widest possible range of system can check the integrity of the release files.

### NetBSD/pc532 System Requirements and Supported Devices

NetBSD/pc532 1.4 runs on a PC532 computer. It supports a subset of the "standard" hardware to date. This is defined as:

- 4 - MB of memory
- 8 serial lines done by 4 scn2681 chips
- the NCR DP8490 SCSI chip (scsi only)
  - Most SCSI disks work (fixed and floppy)
  - A few SCSI tapes work
  - Some SCSI CD-ROM drives work
- The Matthias Pfaller Parallel Port.

NetBSD/pc532 currently expects the ROM monitor to be the "autoboot monitor" of Oct/Nov 1991. It includes support to set up auto booting of NetBSD, including a secondary boot program that the autoboot monitor will load that in turn loads the NetBSD kernel from a NetBSD file system. Source and ROM images of the autoboot monitor are located at

**ftp://ftp.cs.wwu.edu/pub/pc532/mon.auto.tar.gz**

Most of the pc532 specific development of NetBSD/pc532 was done on a machine with 8 MB of memory. It should run with 4 MB of memory although it may be slower.

### Getting the NetBSD System on to Useful Media

The "standard" method of getting NetBSD/pc532 onto your pc532 is via the console terminal and using the downloading parts of the ROM monitor. As such, usually another computer has the distribution on disk and is connected via a serial line to your pc532's console port. A terminal connected to the attached host computer is used to access the pc532 console via a terminal program. The source for a program called download is part of this distribution. Download sends data to the ROM monitor over the serial line.

You may need to find and read the documentation about the ROM monitor download command and other low level comands.

Other methods of getting NetBSD/pc532 on your pc532 may include SCSI tape or SCSI floppy disk or cloning a disk on a system already running NetBSD/pc532.

If you have some operating system already running on your pc532, you can use that OS to get NetBSD/pc532 on a hard disk much easier than with the ROM monitor. (NetBSD/pc532 was developed from Minix/pc532 until it was self hosting. You can run NetBSD and Minix or other OS off the same disk.)

### Preparing your System for NetBSD Installation

The major preparation needed is to make sure you can recover any current bits stored on your pc532. If you don't care about your data on the disk, you don't need to do anything.

### Installing the NetBSD System

(IF you already have NetBSD/pc532 installed and you only want to update your system, see the next section.)

To install NetBSD/pc532, there are several things you need to know. First, NetBSD "autoconfigs" the scsi devices. `floppy-144.fs` has only support for disks configured into the kernel. Starting the search at SCSI address 0, lun 0 and increasing, the first disk found will be sd0 regardless of the address, the second will be sd1. KLONDIKE for example has the following devices installed:

**sd0:** ID 0 LUN 0: Quantum LP52S hard disk drive
**sd1:** ID 1 LUN 0: Micropolis 4110 hard disk drive
**sd2:** ID 2 LUN 0: Teac FC-1, 3.5" floppy disk drive
**sd3:** ID 2 LUN 1: Teac FC-1, 5.25" floppy disk drive
**cd0:** ID 3 LUN 0: Toshiba XM-4101TA CD-ROM drive
**st0:** ID 4 LUN 0: Tandberg TDC3600 QIC tape drive

Only sd0-sd3 are supported by the `floppy-144.fs` kernel.

Next you need to know what the install script wants to do. This install is script on the ram disk root that can do most of the work of configuring your disk.

1. The script assumes your are using the first n sectors of your disk, where you can specify n. It will allow you to create up to 5 file system partitions, one swap partition and one boot partition.
2. You should know how many total sectors are on your disk. The configure will report a head, track, and cylinder count, but I have found that on my disks, it reports something that makes a smaller disk than I really had.
3. It is possible to have the install script make a partition over your save area AND not make a new file system, thus preserving what is there. Then, later you can make a new file system after you no longer need the stuff there. You will need to do only one boot to get things working from the disk.

*The Install Procedure:*

1. Adjust your console device settings. The floppy-144.fs kernel will come up with 9600 baud, 7 bits, even parity and one stop bit. Adjust your terminal to match these settings. The monitor's baud rate can be changed with "baud d'9600".
2. Get floppy-144.fs and boot the kernel from...

   *Floppy* From Floppy: (and using the autoboot monitor) If you have a 1.44 meg SCSI floppy drive, you can put floppy-144.fs onto a 3.5" floppy disk. Insert the disk into your floppy drive and use the monitor's boot command to boot the default image from the floppy. The image booted will ask you for a kernel to load. Answer

**sd*x*a:/netbsd**

Replace *x* with your drive number. For KLONDIKE, *x* would be **2**.

*Tape* You will need to load a copy of `floppy-144.fs` into RAM.

– load the `floppy-144.fs` at 0x260000

– run at 0x3BE020

The boot program will ask you now for a kernel to load. Answer **md0a:/netbsd.gz** *Serial Line* Provided with the distribution is source for program called download. (download.c) This program when used as "download file" will read the contents of the file and output to standard output a byte sequence used by the pc532 ROM monitor to download a binary file into RAM. Using this program on a computer connected to the pc532, one can load a copy of floppy-144.fs into RAM at 0x260000. The boot sequence is now the same as with tape.

3. The floppy-144.fs will run the new sysinst utility as the standard setup. It assumes a VT100 compatible terminal. If you don't want to try using sysinst or you dont' have a VT100, type f followed by the return. Then following these instructions for installation. If you want to use sysinst, read the i386 INSTALL instructions to learn about sysinst. Note: sysinst does not support SLIP or PPP connections.

4. Choose a disk geometry. For me, the reported geometry left some sectors "unallocated". That is, the autoconfig message said the disk had 2428 cylinders, 9 heads, and 93 sectors/track. This gives a total of 2032236 sectors, but I knew that I had 2053880 sectors.

   To help in this process, there is a program "factor" that is on the floppy-144.fs. The usage is "factor number" and it lists the prime factors of number. For example, with the 2053880 sector disk I got:

   ```
   $ factor 2053880
   2053880: 2 2 2 5 51347
   ```

   Not many to choose from, so I tried ...

   ```
   $ factor 2053820
   2053820: 2 2 5 103 997
   ```

   Now I'd like to get about a meg per track:

   ```
   $ echo "2 * 997"|bc
   1994
   ```

   Now I need the number of tracks (or cylinders):

   ```
   $ echo "2 * 5 * 103"|bc
   1030
   ```

   So I ended up choosing 1030 cylinders, 1 head, 1994 sectors/track. I "lost" only 60 sectors, but got a "resonable geometry".

5. run "install" -- it will ask you for the disk geometry and other questions. It will ask you for the geometry and then ask you how many of those sectors you want to use for NetBSD. It also wants to know the size of your boot partition (to be used with the auto-boot monitor), your root partition, your swap partition, and then any other partitions you may want. For the "other" partitions, it will ask for a mount point. The mount point will be "relative to /" and should not include the leading "/". Also, IF you do not want the partition to have newfs run on it (that is it might be the last one and have a copy of floppy-144.fs) enter "NO" to the mount point and it will not run newfs on the partition. It will enter the partition into the disklabel.

6. look around, if you want ... and then halt NetBSD.

7. reboot the machine. Using the autoboot monitor, all you should have to do is give the ROM monitor command "boot". The secondary UFS boot program eventually times out and auto-loads /netbsd. You can get it to do it faster by hitting "return".

If you are not using the autoboot monitor, you will have to figure out the starting sector of the boot images partition and manually load the NetBSD boot loader from the disk using the read command. If you would rather use the autoboot monitor you can get source and ROM images from the URL

**ftp://ftp.cs.wwu.edu/pub/pc532/mon.auto.tar.gz**

8. Now it is time to load all the other files of the distribution: You can do this via --
   - a TCP/IP link (slip, ppp or plip) you have ifconfig, slattach, route, netstat, hostname and ftp on the mini-root. You can even use nfs... Plip is only an option if you have installed a centronics port in your pc532. You do have access to vi to edit your network files. (/etc/resolv.conf, ...)
   - floppy disk
   - tape
   - cd-rom (If you have a CD with NetBSD/532, which most likely won't happen for a while after 1.4 release.)

     ```
     mount -rt cd9660 /dev/cd0a /mnt
     ```

     Get the .tgz files from the cd-rom
   - Use the ROM compatable "download" program. The program download is included in the initial installation and can be used as the receive end of the download by using it as "download -r file_to_write". If the CRC is correct, the file is retained. If the CRC is not correct, the file is deleted.
9. Load the .tgz files. Choose a place to put them. I would make a directory /gz.files and put them there. If you are "short on space," you might want to load them and extract them one at a time. A minimum installation is "base" and "etc". It takes about 32 Megs installed + 20 Megs for the base.tgz.
10. Extract the tar files in /. For example, if your *.tgz were in a directory /gz.files, to extract base.tgz you would:

    ```
    cd /
    tar -xpzf /gz.files/base.tgz --unlink
    ```

    Add v to the flags if you want a verbose extract. The **--unlink** is to make sure that the install versions of sh, init, ... are replaced by their proper versons in base.tgz. I think it is wise to include the **--unlink** for other things.
11. Extract at least "base", "etc" and "kern" for a new installation. For "update" extracts, move /etc to /etc.old and then extract "etc". You should extract "etc" for upgrades. For "full" installations, extract all files.
12. Edit the information in /etc

    | | |
    |---|---|
    | rc.conf | Many things can be configured here |
    | hosts | host name and address information |
    | resolv.conf | which nameserver to use |
    | ttys | make sure the console entry has the correct speed |
    | gettytab | I find "ap" instead of "ep" in the default entry works better for me. |
    | fstab | make sure it includes all partitions you want mounted |

    Now you can adjust the kernel's default baud rate to match your monitor's default baud rate. Do the following:

    ```
    gdb -w /netbsd
    set scndefaultrate = your_baud_rate
    quit
    ```

    where *your_baud_rate* is the actual value, 19200, 38400 or something slower than 9600. If you set scndefaultrate to something bogus, you'll probably not be able to reboot... So be carefull!

13. Reboot the machine and it should come up in multi-user mode *IF* you got it configured correctly.
14. Enjoy! And help fix bugs and improve NetBSD/pc532!

**Post installation steps**

Once you've got the operating system running, there are a few things you need to do in order to bring the system into a propperly configured state, with the most important ones described below.

1. Configuring `/etc/rc.conf`

   If you haven't done any configuration of `/etc/rc.conf`, the system will drop you into single user mode on first reboot with the message
   `/etc/rc.conf is not configured. Multiuser boot aborted.`
   and with the root filesystem mounted read-write. When the system asks you to choose a shell, simply hit return to get to a prompt. If you are asked for a terminal type, respond with **vt220** (or whatever is appropriate for your terminal type) and hit return. At this point, you need to configure at least one file in the `/etc` directory. Change to the `/etc` directory and take a look at the `/etc/rc.conf` file. Modify it to your tastes, making sure that you set `rc_configured=YES` so that your changes will be enabled and a multi-user boot can proceed. If your `/usr` directory is on a separate partition and you do not know how to use 'ed' or 'ex', you will have to mount your `/usr` partition to gain access to 'vi'. Do the following:
   **mount /usr**
   **export TERM=vt220**
   If you have `/var` on a seperate partition, you need to repeat that step for it. After that, you can edit `/etc/rc.conf` with `vi`(1). When you have finished, type **exit** at the prompt to leave the single-user shell and continue with the multi-user boot.

   Other values that need to be set in `/etc/rc.conf` for a networked environment are *hostname* and possibly *defaultroute*, furthermore add an *ifconfig_int* for your interface <int>, along the lines of
   `ifconfig_de0="inet 123.45.67.89 netmask 255.255.255.0"`
   or, if you have *myname.my.dom* in `/etc/hosts`:
   `ifconfig_de0="inet myname.my.dom netmask 255.255.255.0"`
   To enable proper hostname resolution, you will also want to add an `/etc/resolv.conf` file or (if you are feeling a little more adventurous) run `named`(8). See `resolv.conf`(5) or `named`(8) for more information.

   Other files in `/etc` that are new to NetBSD 1.4 and may require modification or setting up include `/etc/mailer.conf`, `/etc/nsswitch.conf` and `/etc/wscons.conf`.

2. Logging in

   After reboot, you can log in as `root` at the login prompt. There is no initial password, but if you're using the machine in a networked environment, you should create an account for yourself (see below) and protect it and the "root" account with good passwords.

3. Adding accounts

   Use the `vipw`(8) command to add accounts to your system, *do not* edit `/etc/passwd` directly. See `adduser`(8) for more information on the process of how to add a new user to the system.

4. The X Window System

   If you have installed the X window system, look at the files in `/usr/X11R6/lib/X11/doc` for information.

Don't forget to add /usr/X11R6/bin to your path in your shell's dot file so that you have access to the X binaries.

5. Installing 3rd party packages

   There is a lot of software freely available for Unix-based systems, almost all of which can run on NetBSD. Modifications are usually needed to when transferring programs between different Unix-like systems, so the NetBSD packages collection incorporates any such changes necessary to make that software run on NetBSD, and makes the installation (and deinstallation) of the software packages easy. There's also the option of building a package from source, in case there's no precompiled binary available.

   Precompiled binaries can be found at
   **ftp://ftp.netbsd.org/pub/NetBSD/packages/**
   Package sources for compiling packages can be obtained by retrieving the file
   **ftp://ftp.netbsd.org/pub/NetBSD/NetBSD-current/tar_files/pkgsrc.tar.gz**
   and extracting it into /usr/pkgsrc. See /usr/pkgsrc/README then for more information.

6. Misc

   - To adjust the system to your local timezone, point the /etc/localtime symlink to the appropriate file under /usr/share/zoneinfo.
   - Edit /etc/aliases to forward root mail to the right place (run newaliases(1) afterwards.)
   - The /etc/sendmail.cf file will almost definitely need to be adjusted; files aiding in this can be found in /usr/share/sendmail. See the README file there for more information.
   - Edit /etc/rc.local to run any local daemons you use.
   - Many of the /etc files are documented in section 5 of the manual; so just invoking
     **man** *filename*
     is likely to give you more information on these files.

**Upgrading a previously-installed NetBSD System**

The upgrade to NetBSD 1.4 is a binary upgrade; it can be quite difficult to advance to a later version by recompiling from source due primarily to interdependencies in the various components.

To do the upgrade, you must have at least base.tgz on disk and a copy of the proper netbsd.default. It will require quite a bit of disk space to do the upgrade.

Since upgrading involves replacing the kernel, and most of the system binaries, it has the potential to cause data loss. You are strongly advised to BACK UP ANY IMPORTANT DATA ON YOUR DISK, whether on the NetBSD partition or on another operating system's partition, before beginning the upgrade process.

To upgrade your system, follow the following instructions:

- Assuming you have space, load the .tgz files onto disk some place. Then boot the floppy-144.fs image via the method you use. Under the install system, extract the .tgz files as mentioned below or read the i386 INSTALL notes for how to use sysinst.
- Extract the .tgz files. For example, to extract base.tgz:

```
cd /
pax -zrvpe -f /gz.files/base.tgz
```

- Extract all the .tgz files you want. You should carefully work at upgrading /etc. There may be changes to file formats depending on what version of NetBSD/pc532 you are running.

- *Be careful if you are not running with security.* The 1.4 distribution does contain support for password encryption. If you are upgrading from 1.0, it would be reasonable to save a copy of master.passwd and remove all passwords until after you upgrade. (NetBSD-1.0 did not ship with password encryption.)
- Place netbsd.default in / as the file netbsd.
- Reboot. (Remember, detbsd.default is a 9600 console line kernel. Read the last part of the new installation part of these notes to find out how to change your default speed.)
- After reboot, you should make sure you check your new file systems.

### Compatibility Issues With Previous NetBSD Releases

Users upgrading from previous versions of NetBSD may wish to bear the following problems and compatibility issues in mind when upgrading to NetBSD 1.4

*Note* Only issues effecting an upgrade from NetBSD 1.3 or NetBSD 1.3.x are decribed here.

- "machine" directory/link in "/usr/include"

  Description
  Some architecture may fail to install the **comp** set because the
  `/usr/include/machine`
  directory changed to a symbolic link in NetBSD 1.4.

  Fix If this happens, you can use the command
  # **rm -r /usr/include/machine**
  to remove the old directory and it contents and reinstall the **comp** set.

### Using online NetBSD documentation

Documentation is available if you first install the manual distribution set. Traditionally, the "man pages" (documentation) are denoted by "`name(section)`". Some examples of this are

- `intro`(1),
- `man`(1),
- `apropros`(1),
- `passwd`(1), and
- `passwd`(5).

The section numbers group the topics into several categories, but three are of primary interest: user commands are in section 1, file formats are in section 5, and administrative information is in section 8.

The *man* command is used to view the documentation on a topic, and is started by entering **man** [*section*] *topic*. The brackets [ ] around the section should not be entered, but rather indicate that the section is optional. If you don't ask for a particular section, the topic with the lowest numbered section name will be displayed. For instance, after logging in, enter

**man passwd**

to read the documentation for `passwd`(1). To view the documentation for `passwd`(5)m enter

**man 5 passwd**

instead.

If you are unsure of what man page you are looking for, enter **apropos** *subject-word*

where *subject-word* is your topic of interest; a list of possibly related man pages will be displayed.

### Administrivia

If you've got something to say, do so! We'd like your input. There are various mailing lists available via the mailing list server at `majordomo@NetBSD.ORG`. To get help on using the mailing list server, send mail to that address with an empty body, and it will reply with instructions.

There are various mailing lists set up to deal with comments and questions about this release. Please send comments to: `netbsd-comments@NetBSD.ORG`.

To report bugs, use the `send-pr`(1) command shipped with NetBSD, and fill in as much information about the problem as you can. Good bug reports include lots of details. Additionally, bug reports can be sent by mail to: `netbsd-bugs@NetBSD.ORG`.

Use of `send-pr`(1) is encouraged, however, because bugs reported with it are entered into the NetBSD bugs database, and thus can't slip through the cracks.

There are also port-specific mailing lists, to discuss aspects of each port of NetBSD. Use majordomo to find their addresses. If you're interested in doing a serious amount of work on a specific port, you probably should contact the "owner" of that port (listed below).

If you'd like to help with this effort, and have an idea as to how you could be useful, send us mail or subscribe to: `netbsd-help@NetBSD.ORG`.

As a favor, please avoid mailing huge documents or files to these mailing lists. Instead, put the material you would have sent up for FTP somewhere, then mail the appropriate list about it, or, if you'd rather not do that, mail the list saying you'll send the data to those who want it.

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(If you're not on that list and should be, tell us! We probably were not able to get in touch with you, to verify that you wanted to be listed.)

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