The Linux Emacspeak HOWTO

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This document describes how a blind user can use Linux with a speech synthesizer to replace the video display. It describes how to get Linux running on your own PC, and how to set it up for speech output. It suggests how to learn about Unix.

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1 Introduction

Emacspeak is an Emacs subsystem that allows the user to get feedback using synthesized speech.

Screen reading programs allow a visually impaired user to get feedback using synthesized speech. Such programs have been commercially available for well over a decade. Most of them run on PC's under DOS, and there are now a few screen-readers for the Windows platform. However, screen-readers for the UNIX environment have been conspicuous in their absence.

This means that most visually impaired computer users face the additional handicap of being DOS-impaired – a far more serious problem:-)

Emacspeak is an emacs subsystem that provides basic speech access. Emacspeak will always have the shortcoming that it will only work under Emacs. This said, there is very little that cannot be done inside Emacs, so it's not a real shortcoming:-) Within Emacs, you can open a "shell window" where run commands and examine their output, even output which has scrolled out of the window. Emacs provides special modes for running certain commands. For example, it can parse error messages printed by a compiler and open a separate edit window with the cursor at the point of the error. It can also run a debugger and keep a separate edit window open at the point in the source code corresponding to the program counter.

Emacspeak does have a significant advantage: since it runs inside Emacs, a structure-sensitive, fully customizable editor, Emacspeak often has more context-specific information about what it is speaking than its commercial counterparts. In this sense, Emacspeak is not a "screenreader", it is a subsystem that produces speech output. A traditional screen-reader speaks the content of the screen, leaving it to the user to interpret the visually laid-out information. Emacspeak, on the other hand, treats speech as a first-class output mode; it speaks the information in a manner that is easy to comprehend when listening.

This initial version provides a basic speech subsystem for Emacs; using Emacs' power and flexibility, it has proven straightforward to add modules that customize how things are spoken, e.g. depending on the major/minor mode of a given buffer. Note that the basic speech functionality provided by Emacspeak is sufficient to use most Emacs packages effectively; adding package-specific customizations makes the

interaction much smoother. This is because package-specific extensions can take advantage of the current context.

This document is limited to the following:

- Linux (not Free BSD)
- The Slackware distribution (not Red Hat, Debian, etc.)
- Speech output only (not Braille - see the Access HOWTO)
- Dectalk synthesizers (Dectalk Express and MultiVoice–not the Accent, SmarTalk, a sound card, etc.)
- Use of Emacs, with T. V. Raman's Emacspeak package, to drive the synthesizer.

The use of adaptive technology with Linux, and in particular, using adaptive technology to make Linux accessible to those who could not use it otherwise, is covered in the Linux Access HOWTO.

If you would like to help extend this document to cover one or more of the other alternatives, or point me to a discussion somewhere else, please contact me.

Emacspeak was written by T. V. Raman `raman@adobe.com`. Emacspeak has a Web page at `<http://www.cs.cornell.edu/Info/People/raman/emacspeak/emacspeak.html>`.

Computer hardware, Unix user commands, Unix system administration, Emacs, and Emacspeak are each substantial systems. Attempting to learn all of them at once is likely to lead to frustration. Instead, I suggest that the new user go through a sequence of stages, learning about only one system at a time.

2 Stage 1. DOS with speech

Most blind computer users have speech synthesizers with a screen reader program like JAWS [6.1]. (References in this format refer to entries in the "Footnotes and References" section below.) Using this setup, install and become familiar with some terminal emulator like Telix [6.2] or Commo [6.3], which are available from the SimTel archive [6.4] among others.

2.1 Getting Linux on CDROM

If you have or can borrow a CDROM drive, I recommend you get one of the many good distributions of Linux on that medium. I am most familiar with disks from InfoMagic [6.5]. Another source is Walnut Creek [6.6] (who originated the whole idea of inexpensive CDROMS full of programs from Internet archives). Distributions other than Slackware are available from Red Hat [6.7], Craftwork [6.8], and Yggdrasil [6.9]. As a rule, these CDROMS use the "ISO 9660" format, which can be read under DOS. (They also use the "Rock Ridge extensions" which add extra files in each directory. Linux uses the extra information to give you long filenames, both upper and lower case characters in filenames, and file permissions.)

2.2 Getting Linux by FTP

Another way to get Linux and its documentation is by FTP over the Internet. Its home site is Walnut Creek [6.6]. It is also carried by sunsite and many of it mirror sites. Here is a partial list:

- USA (home site) `<ftp://ftp.cdrom.com/pub/linux/slackware>`
- UK/Europe
  `<ftp://src.doc.ic.ac.uk/public/Mirrors/ftp.cdrom.com/pub/linux/slackware-3.1>`
- Japan `<ftp://ftp.cs.titech.ac.jp/pub/os/linux/slackware>`
- Taiwan `<ftp://NCTUCCCA.edu.tw/OS/Linux/Slackware>`
- Hong Kong `<ftp://ftp.cs.cuhk.hk/pub/slackware>`
- USA `<ftp://sunsite.unc.edu/pub/Linux/distributions/slackware>`
- USA
  `<ftp://uiarchive.cso.uiuc.edu/pub/systems/linux/sunsite/distributions/slackware>`

More sites are listed in the INFO-SHEET
`<ftp://sunsite.unc.edu/pub/Linux/docs/HOWTO/INFO-SHEET>`. Sunsite can also be reached using a Web browser: `<http://sunsite.unc.edu/pub/Linux/welcome.html>`.

2.3 Linux Documentation

Read the Linux documentation. I will quote here the file names and locations on the first disk of InfoMagic's November 1995 "Developer's Resource" set of five CDROMS, as seen under DOS. Other CDROM sets should have similar information, though perhaps differently arranged. There are general guides to the disks in the set in `\readme.1st` and `\help\whereami.txt`. Matt Welsh's step by step guide to installing Slackware is in `\help\quicksta.txt`. (This is slightly dated. For example, you no longer need to decompress the root disks before writing them out. However, it is still a "must-read".)

More general information is in the Linux "Frequently Asked Questions" list in `\slackwar\docs\linux.faq\linux-fa.asc`. Longer descriptions are in "HOWTO" documents (of which this is one). They are found in `\howto`. Note particularly `\howto\hardware`, which lists which kinds of hardware are supported by Linux, `\howto\meta-faq`, which points to sources of information (that is, a more extensive version of this paragraph), and `\help\index`, which is a list of the HOWTO documents with short descriptions. The Linux installation HOWTO, `\howto\installation`, is another version of Matt Welsh's installation instructions.

One note on reading the documentation. You may run into files with ASCII highlighting, where character-backspace-character stands for "bold", and underscore-backspace-character stands for "italics". One way to handle this is to use the `less` program, which displays these sequences in alternate colors. A DOS screenreader can, for example, search for such highlighted text. A DOS version of `less` can be obtained by FTP from the SimTel archive [6.4]. Within the SimTel collection, look for directory msdos/textutil. For example, try `<ftp://ftp.coast.net/pub/SimTel/msdos/textutil>`.

I will suggest four alternatives for learning Emacs commands (see section [3.2]). The first option is to install Emacs under DOS and learn it while using the DOS screen reader. Where to get Emacs for DOS is a "frequently asked question" [6.10].

The source code for Emacs (about 10 MB) can be gotten from `<ftp://prep.ai.mit.edu/pub/gnu/emacs-19.31.tar.gz>`, or from one of many mirrors of the GNU collection [6.11].

3 Stage 2. Terminal to remote UNIX system

Arrange for what is called a "shell account" on some Unix system. Most Internet Service Providers (ISPs) can provide this service. Use the terminal emulator program and a modem to dial in. Learn the basic Unix commands. If the system has Emacs installed, or you can persuade the system administrator to install it, this is your second chance to learn it. It is probably best to learn it at this point, because administering a Unix system (the next stage) will call for you to edit files. Therefore, I include here my suggestions for learning both Unix and Emacs.

3.1 Learning Unix

When you arrange for a shell account, or set up a new account on your own machine, you will have to decide on a username and a password. Your username will also be used in your email address, so try to find something short and memorable. Your password is important, and should be hard to guess. That usually means at least six characters, including at least one non-alphanumeric character.

When a Unix system is ready for you to log in, it normally displays a prompt ending with "login:". At this point you should type in your username. It will then prompt you for your password, and will turn off command echoing while you type it in.

The command to finish a terminal session is `logout`.

To learn about a command, use the `man` command to type its manual page ("man page" for short). For example, to learn more about the `cp` command by typing `man cp`. Of course, this helps only if you know or can guess the command name. However, each man page has a line near the beginning with the command name, a minus sign, and a short description of what the command does. You can search a database of these lines using the command `apropos`. Thus, typing `apropos working` will list lines that include the word "working".

Under Unix, commands normally accept options starting with a minus sign rather than the forward slash used under DOS. In a path, directory names are separated by forward slashes rather than backward slashes. Both operating systems have a "standard input", by default the keyboard, and a "standard output", by default the display screen. You can redirect the standard input using "<", and redirect the output using ">". You can use the output from one command as the input of another by separating the two commands with "|". This is called the "pipe" symbol.

The program that interprets your command is a "shell". Most shells are decendents of either the Bourne shell `sh` or the C shell `csh`. The shell most commonly used with Linux is the "Bourne again shell", or `bash`.

It has several features which can reduce the need for typing. You can use the cursor up key key to bring previous commands to the command line. The cursor will be at the end of the command. You can use cursor left and right to move the cursor within the command, and edit it with Emacs style commands (^D or DEL to delete the character to the right, et cetera). Also, you can insert the last word in the previous command with ESC-. (escape period). You can learn about these and other commands from the bash man page, in the section entitled "READLINE".

If a program gets "stuck", here is a sequence of keystrokes to try:

- ^Q (that is, control-Q). You may have sent a ^S, which halts all output, without realizing it. The ^Q will restart it.
- ^D, which signals "end of file" under Unix (similar to ^Z under DOS), in case the program expects input which you are not prepared to supply.
- ^C is an interrupt, which may halt the program.
- ^Z puts the program in the background. At this point you may simply log out, although you will be warned about the background process and will have to repeat the `logout` command. You can instead kill the process, as follows: Run `ps` with no arguments. It will list a header line, then one line for each of your processes. The first item on each line is the process id number, or PID. The command used to start the process (or at least the beginning of it) appears at the end of the line. If the PID were 117, you would kill the process with the command `kill -9 117`.
- alt-2, or some other alt-number combination, will switch to a different virtual console. You can log in there just as if you had sat down to a different terminal.
- Control-alt-del should reboot the computer nondestructively.
- As a last resort, you can hit "reset" or cycle the power. This will leave the filesystems in an invalid state, since some buffers will not have been written to disk. The kernel will discover this while booting, and will take time to check and repair the filesystems. Actual data loss is unlikely unless you had something else going on at the time.

Guido Gonzato `Guido@ibogfs.cineca.it` has written an excellent guide to Linux for (former) DOS users, the DOS2Linux mini-HOWTO. You can probably find it in the same directory as this document, or else at `<ftp://sunsite.unc.edu/pub/Linux/docs/HOWTO/mini>`.

You can find general Unix information, including manual pages for several systems at `<http://www.cis.ohio-state.edu/hypertext/man_pages.html>`

There is a tutorial entitled "Beginning Unix and the C Shell" at `<http://www.eng.hawaii.edu:80/Courses/C.unix/page-03.html>`.

You can get general help from `<http://www.nova.edu/Inter-Links/UNIXhelp/TOP_.html>` or `<http://www.eecs.nwu.edu/unix.html>`

You can find a list of books on UNIX at `<http://www.eskimo.com/ cher/eskimospace/booklist.html>`.

3.2 Learning Emacs

When you start Emacs, you will normally list on the command line one or more files which you will be editing. To edit a file named "foobar" with Emacs, you would enter the command `emacs foobar`. If you enter the command `emacs` with no arguments, GNU Emacs will assume you are a new user, and print out an introduction which includes the first five commands you need to learn, approximately as follows:

```
Type C-h for help;   (‘C-’ means use CTRL key.)
Type C-x u to undo changes.
Type C-h t for a tutorial on using Emacs.
Type C-h i to enter Info, which you can use to read GNU documentation.
To kill the Emacs job, type C-x C-c.
```

Note the way Emacs documentation refers to key combinations. C-h means hold the control key down while typing "h". You will also run into key combinations like M-v, which is pronounced "meta v". The tutorial suggests holding down the key labeled "edit" or "meta" then typing "v". I have never run across a keyboard with those keys, so I always use the escape key instead: typing "Esc" then "v" (two separate keystrokes). After using Emacs for a long time, I discovered that under Linux, the left "Alt" key works like a "meta" key. You may want to use this. On the other hand, some of these key combinations may conflict with your screen reader or communications program under DOS. Using the escape key is more reliable.

Three of the above commands start with C-h, which may be treated as a backspace by your communications program. In that case, you may access the help command using the long form M-x help. Conversely, you may find that pressing the backspace key starts the help command. This issue is treated in the Emacs FAQ, which is available within Emacs using C-h F or M-x help F. Look for the question "Why does the ‘Backspace’ key invoke help?". In this case, you may also find that C-s and C-q are unavailable because they are used for flow control (XON and XOFF). You should look at the question "How do I handle C-s and C-q being used for flow control?" in the FAQ. For the particular command C-x C-s (save buffer), you may substitute the command C-x s (save-some-buffers). The former command saves the current buffer, while the latter asks the user about each of the modified buffers.

Note in particular the command "C-h t" to start the tutorial. That is one the first things you will want to try. I will only make a couple of comments on the tutorial. To move the cursor, it gives the four commands C-f, C-b, C-p, and C-n (for forward, back, previous line, and next line). These commands always work. However, with a properly installed Emacs, the regular arrow keys should also work. Try them out and use them if you are more comfortable with them. Similarly, you may be able to use home, end, page down, and page up keys in place of the standard commands C-a, C-e, C-v, and M-v. Finally, all Emacspeak commands begin with C-e. Once you start using Emacspeak, you will have to type it twice to get the end of line function. (The "End" key should be unaffected by Emacspeak.)

4 Stage 3. Terminal to local Linux system

This arrangement again requires a DOS machine with a speech synthesizer and a terminal emulator program. However, instead of dialing up a remote computer, it is used as a terminal to a local computer running Linux. To get to this point, you need to install Linux on a machine. You may be able to prevail on

a knowledgable friend to help you with this. However, it is also possible to install it yourself with speech feedback for almost the whole procedure.

4.1 Installing Linux

First, some background. Even the simplest Unix system requires a program called the kernel and a root file system. The kernel has all the device drivers and resource management functions. One normally thinks of a "file system" as residing on a hard disk or floppy disk, but during an installation it is usually in ram. Linux is normally installed by writing a kernel image to a floppy disk, called the "boot floppy", configuring it to reserve a section of RAM for a ramdisk, then filling that ramdisk with data from a second floppy disk, called the "root floppy". As soon as both floppies have been read in, the user can log in as "root" and complete the installation. The sighted user logs in on the "system console", that is, the computer's own keyboard and video display. However, remember that Unix has been a multiprocessing operating system from the very beginning. Even this very primitive Unix system, running out of a small ramdisk, also supports logins from a terminal connected to a serial port. This is what a blind user can use.

To connect the two computers, you can use a "null modem", a serial cable that connects ground to ground, and transmit on each end to receive on the other. The cable that comes with the DOS application LapLink will work fine. It is particularly handy, in fact, because it has both a 9 pin and a 25 pin connector on each end. If you want to check a cable or have one made, here are the required connections:

For two 9 pin connectors, connect pin 2 (receive data) to pin 3, pin 3 (transmit data) to pin 2, and pin 5 (signal ground) to pin 5.

For two 25 pin connectors, connect pin 2 (receive data) to pin 3, pin 3 (transmit data) to pin 2, and pin 7 (signal ground) to pin 7.

For a 9 pin connector (first) to a 25 pin connector (second), connect pin 2 (receive data) to pin 2 (transmit data), pin 3 (transmit data) to pin 3 (receive data), and pin 5 (signal ground) to pin 7 (signal ground).

You may have noted that I have included no connections for the "handshaking" signals. During login, the serial port is handled by the program `agetty`. Recent versions of this program accept a -L switch which tells it not to expect modem control signals. The version in Slackware 3.0 does, but the one on the 3.0 (and earlier) installation root disks does not. However, Pat Volkerding has assured me that the root disks in the next release of Slackware will have the updated version of `agetty`. It is also possible to use the earlier root disks [6.12]. (The messages quoted below come from Slackware 3.0 because that's the most recent release I have. I'll update them after the new release comes out.)

Consult the documentation on your CDROM, or downloaded from an FTP site, and choose a boot disk with the proper kernel features for your hardware (IDE or SCSI, CDROM driver, etc.). I have the InfoMagic November 1995 "Developer's Resource" set of five CDROMS. Slackware 3.0 is on disk 1 of that set. Documentation on the boot floppies is in slackwar/boot144/WHICH.ONE. The DOS program for writing boot images to a floppy is utils/rawrite.exe. Therefore, one might use these commands to write to a disk in the A drive:

```
c>m:
m>cd \verb+\+slackwar\verb+\+boot144
m>m:\verb+\+utils\verb+\+rawrite
```

```
scsinet1
a
```

Similarly, to write the "text" root disk:

```
c>m:
m>cd \verb+\+slackwar\verb+\+rootdsks
m>\verb+\+utils\verb+\+rawarite
text.gz
a
```

For the actual installation, proceed as follows: Use the null modem to connect the computer running DOS and equipped with speech output (henceforth called the "DOS computer") to the computer into which you want to install Linux (henceforth the "Linux computer").

Boot the DOS machine, and start your terminal emulation program. Set it up for 9600 baud, no parity, eight data bits, 1 stop bit.

On the Linux machine, insert the "boot" disk and boot (power up, cntl-alt-del, or hit the reset switch). It should read the disk for five seconds or so, and stop with the following text:

(Note: in the following, the large blocks of text quoted from the installation disks are preceded by "– begin quote" and followed by "– end quote". To skip to the end of a quote, you may search for two dashes starting in the first column.)

```
-- begin quote

     Welcome to the Slackware Linux 3.0.0 bootkernel disk!

     If you have any extra parameters to pass to the kernel, enter them at the
     prompt below after one of the valid configuration names (ramdisk, mount, drive2)
     Here are some examples (and more can be found in the BOOTING file):

       ramdisk hd=cyl,hds,secs   (Where "cyl", "hds", and "secs" are the number of
                                  cylinders, sectors, and heads on the drive.  Most
                                  machines won't need this.)

     In a pinch, you can boot your system with a command like:
       mount root=/dev/hda1

     On machines with low memory, you can use mount root=/dev/fd1 or
     mount root=/dev/fd0 to install without a ramdisk.  See LOWMEM.TXT for details.

     If you would rather load the root/install disk from your second floppy drive:
       drive2  (or even this:  ramdisk root=/dev/fd1)

     DON'T SWITCH ANY DISKS YET! This prompt is just for entering extra parameters.
     If you don't need to enter any parameters, hit ENTER to continue.
```

```
boot:
```

```
-- end quote
```

I have almost always been able to just hit "enter" at this point.

After your entry, it should read the floppy for another twenty seconds or so, then boot the kernel. Each device driver in the kernel displays a line or two. The particular disk I'm using (the "bare" bootdisk) displays more than one screen's worth. It is possible to type shift-page up to scroll the text back. On my machine, the boot messages are as follows:

```
-- begin quote
```

```
Loading ramdisk.....
Uncompressing Linux...done.
Now booting the kernel
Console: colour EGA+ 80x25, 1 virtual console (max 63)
Calibrating delay loop.. ok - 17.47 BogoMips
Serial driver version 4.11 with no serial options enabled
tty00 at 0x03f8 (irq = 4) is a 16550A
lp1 at 0x0378, using polling driver
PS/2 auxiliary pointing device detected -- driver installed.
ftape: allocated 3 buffers aligned at: 0138000
hda: IBM-DBOA-2720, 689MB w/64KB Cache, LBA, CHS=700/32/63, MaxMult=32
ide0: primary interface on irq 14
Floppy drive(s): fd0 is 1.44M
FDC 0 is a 8272A
Memory: 5524k/8384k available (648k kernel code, 384k reserved, 1828k data)
This processor honours the WP bit even when in superviser mode.  Good.
Swansea University Computer Society NET3.019
Swansea University Computer Society TCP/IP for NET3.019
IP Protocols: ICMP, UDP, TCP
PPP: version 0.2.7 (4 channels) NEW_TTY_DRIVERS OPTIMIZE_FLAGS
TCP compuression code copyright 1989 Regents of the University of California
PPP line discipline registered.
SLIP: version 0.8.3-NET3.019-NETTTY (4 channels) (6 bit encapsulation enabled)
CSLIP: code copyright 1989 Regents of the University of California
Checking 386/387 coupling... Ok, fpu using exception 16 error reporting.
Checking 'hlt' instruction... Ok.
Linux version 1.2.13 (root@bigkitty) (gcc version 2.7.0) #1 Tue Aug 22 22:23:13
CDT 1995
Partition check:
  hda: hda1 hda2 hda3
VFS: Insert ramdisk floppy and press ENTER
```

```
-- end quote
```

Some messages will of course be different on a machine with different hardware. Now, insert the "text" rootdisk and press ENTER. After it is read, the following is displayed on the console, and should also be displayed on the DOS machine (and therefore spoken):

```
-- begin quote

     VFS: Disk change detected on device 2/28
     RAMDISK : starting gunzip of rootdisk image... 10
     done.
     VFS: Mounted root (minix filesystem).
     Apr 12 23:00:57 init[1]: version 2.4 booting
     none on /proc type proc (rw)
     Apr 12 23:00:57 init[1]: Entering runlevel: 4


     Welcome to the Slackware Linux installation disk ,version 3.0.0-tty!
     ### READ THE INSTRUCTIONS BELOW CAREFULLY! ###

     You will need one or more partitions of type "Linux native" prepared. It is
     also recommended that you create a swap partition (type "Linux swap") prior to
     installation. Most users can use the Linux "fdisk" utility to create and tag
     the types of all these partitions. OS/2 Boot Manager users, however, should
     create their Linux partitions with OS/2 "fdisk", add the bootable (root)
     partition to the Boot Manager menu, and then use the Linux "fdisk" to tag the
     partitions as type "Linux native".

     If you have 4 megabytes or less of RAM, you MUST ACTIVATE a swap partition
     before running setup. After making the partition with fdisk, use:

     mkswap /dev/<partition> <number of blocks> ; swapon /dev/<partition>

     Once you have prepared the disk partitions for Linux, type "setup" to
     begin the installation process.

     You may now login as "root".

     slackware login:

-- end quote
```

If you don't get this prompt, try the following:

- Type a single carriage return.
- Recheck the terminal setup (9600 baud, no parity, eight data bits, 1 stop bit)
- Disconnect the null modem from the DOS machine. In its place, connect a modem which supports the Hayes "AT" commands. Type `AT` and a carriage return. You should get a reply of "OK" from the modem.

Once you get the above prompt on the DOS machine, you may type `root` and a single carriage return to log in, and complete the installation like any other user. Of course, you must remember to include these four packages: emacs, emacspeak, tcl, and tclX.

The installation script will offer to prepare a boot floppy. You should do this, since it is the most foolproof way to boot Linux. You will probably also want to install `lilo` (which is an abbreviation for "Linux loader") and/or `loadlin` (which is an abbreviation for "load Linux"). The installation script can install lilo. Loadlin is a DOS program that will let you boot from DOS to Linux. Install it on a DOS partition, and copy a compressed kernel file (usually named `zImage`) to the same partition. While running DOS, you may boot Linux with a command like `loadlin zimage root=/dev/hda3 ro/`. (I have assumed here that the kernel image is in the same directory as the loadlin program. You may find it more convenient to store kernel images in subdirectories named for the kernel version.)

Reboot the Linux machine with the new boot floppy, with the DOS machine still connected. You should get a login prompt on the DOS machine. Celebrate! After getting this system working, you need to learn emacs (third option) and Unix system administration.

4.2 Learning Unix System Administration

Mostly you will learn system administration as the need arises. First adding a user (yourself), then installing programs, and so forth. The exception to this is making backups, which you should learn **before** you need them.

You will need to learn these programs:

tar

Create and unpack `.tar` files, which are collections of files (something like `.zip` files). To list the contents of an archive, use `tar -tf foobar.tar`. For a more verbose listing, use `tar -tvf foobar.tar`. To unpack an archive, use `tar -xf foobar.tar`.

find

Search directories recursively. For example, the command `find . -name '*alpha*' -print` means: search starting in the current directory (`.`) for a file whose name contains the string "alpha" (`-name '*alpha*'`), and print its path and name (`-print`). (With GNU find, the `-print` is optional.)

df

Display filesystem capacities, free space, and where they are mounted.

mount

Display filesystems, where they are mounted, and the mount flags.

ftp

Transfer files across the Internet.

Here are some programs you may want to install:

agrep

Approximate grep searches for approximate, not exact, string matches (also called "fuzzy string searches").

archie

Search Internet archives for files.

flip

Convert text files between Unix and DOS formats.

glimpse

Fuzzy string searches in large collection of files (uses agrep).

lynx

Text mode web browser.

Here are some Web pages related to Unix system administration:

General information `<http://www.ensta.fr/internet/unix/sys_admin/>` or `<http://www.sai.msu.su/sysadm.html>`

There is a Unix system administration tutorial at `<http://www.iem.ac.ru/sysadm.html>`

UnixWorld Online Magazine Home Page `<http://www.wcmh.com/uworld/>`

Internet Essentials for UNIX System Administrators Tutorial `<http://www.greatcircle.com/tutorials/ieusa.html>`

Pointers to Unix goodies available on the Internet `<http://www.ensta.fr/internet/unix/>`

Pointers to Unix system administration "goodies" available on the Internet `<http://www.ensta.fr/internet/unix/sys_admin/>`

5 Stage 4. Emacspeak under Linux

The Slackware setup script for Emacspeak should create the needed environment variables and a install a script `emacspeak` that starts emacs with emacspeak. This is your fourth option for learning Emacs. This is the first time you will be able to actually use Emacspeak. A short tutorial appears below. Within Emacs, you may type C-h C-e to get a list of the commands. To search for a command, use C-h a. To get an explanation for a key sequence, use C-h k. There is also an info file which is part of the Emacspeak distribution. Within emacs, you may type C-u C-h i, then enough backspaces to delete the default path (that is, until the beep), then `"/usr/info/emacspeak.info"`. If you have the standalone info program installed, you can consult the info file with the command `info Emacspeak`.

5.1 Emacspeak Introduction - Speech Enabled Normal Commands

All of the normal Emacs movement commands will speak the relevant information after moving. Here are some of the cursor movement functions that have been speech enabled. Note that this list only enumerates a few of these speech enabled commands; the purpose of emacspeak is to speech-enable all of emacs and provide you spoken feedback as you work. Thus, this list is here only as a representative example of the kind of speech-enabling extensions Emacspeak provides.

'C-n' or 'M-x next-line' or 'down' Moves the cursor to the next line and speaks it.

'C-p' or 'M-x previous-line' or 'up' Moves the cursor to the previous line and speaks it.

'M-f' or 'M-x forward-word' or Moves the cursor to the next word and speaks it. Places point on the first character of the next work, rather than on the space preceding it (This is my personal preference).

'M-b' or 'M-x backward-word' Moves the cursor to the previous word and speaks it.

'M-C-b' or 'M-x backward-sexp' Moves the cursor to the previous sexp and speaks it. If the sexp spans more than a line, only the first line is spoken.

'M-<' or 'M-x beginning-of-buffer' Speaks line moved to.

'M->' or 'M-x end-of-buffer' Speaks line moved to.

'M-m' or 'M-x back-to-indentation' Speaks entire current line. A useful way of hearing the current line.

5.2 Emacspeak Introduction - New Commands

Emacspeak provides a number of commands for reading portions of the current buffer, getting status information, and modifying Emacspeak's state.

All of the commands are documented in the subsequent sections. They can be classified into types:

Emacspeak commands for listening to chunks of information. The names of these commands all start with the common prefix 'emacspeak-'. All Emacspeak commands are bound to the keymap EMACSPEAK-KEYMAP and are accessed with the key 'Control e'. Thus, the Emacspeak command "emacspeak-speak-line" is bound to 'l' in keymap EMACSPEAK-KEYMAP and can be accessed with the keystroke 'Control-e l'.

Here are some of the commands for reading text:

'C-e c' or 'M-x emacspeak-speak-char' Speak current character, using the phonetic alphabet.

'C-e w' or 'M-x emacspeak-speak-word' Speak current word.

'C-e l' or 'M-x emacspeak-speak-line' Speak current line. With prefix arg, speaks the rest of the line from point. Negative prefix optional arg speaks from start of line to point. Voicifies if voice-lock-mode is on. Indicates indentation with a tone if audio indentation is in use. Indicates position of point with an aural highlight if option emacspeak-show-point is turned on –see command 'M-x emacspeak-show-point'.

'C-e .' or 'M-x emacspeak-speak-sentence' Speak the current sentence.

'C-e C-c' or 'M-x emacspeak-speak-current-window' Speak everything in the current window.

'C-e s' or 'M-x dtk-stop' Stop speech now. In addition, any command that causes speech output will discard anything in the speech buffer.

'C-e =' or 'M-x emacspeak-speak-current-column' State the column where point is.

The second category of commands provided by Emacspeak manipulate the state of the speech device. The names of these commands start with the common prefix 'dtk-'. You can access these commands via the prefix 'Control-e d'. Thus, the command "dtk-set-rate" is bound to 'r' in keymap EMACSPEAK-DTK-SUBMAP and can be executed by pressing 'Control e d r'.

'C-e d I' or 'M-x dtk-toggle-stop-immediately-while-typing' Toggle state of variable dtk-stop-immediately-while-typing. As the name implies, if true then speech flushes immediately as you type.

'C-e d i' or 'M-x emacspeak-toggle-audio-indentation' Toggle state of Emacspeak audio indentation. Specifying the method of indentation as 'tone' results in the DECtalk producing a tone whose length is a function of the line's indentation. Specifying 'speak' results in the number of initial spaces being spoken.

'C-e d k' or 'M-x emacspeak-toggle-character-echo' Toggle state of Emacspeak character echo (that is, whether typed characters are echoed).

'C-e d w' or 'M-x emacspeak-toggle-word-echo' Toggle state of Emacspeak word echo (initially on).

'C-e d l' or 'M-x emacspeak-toggle-line-echo' Toggle state of Emacspeak line echo (that is, whether typed text is echoed after typing enter).

'C-e d p' or 'M-x dtk-set-punctuations' Set punctuation state. Possible values are 'some', 'all', or 'none'.

'C-e d q' or 'M-x dtk-toggle-quiet' Toggle state of the speech device between being quiet and talkative. Useful if you want to continue using an emacs session that has emacspeak loaded but wish to make the speech shut up.

'C-e d R' or 'M-x dtk-reset-state' Restore sanity to the Dectalk. Typically used after the Dectalk has been power cycled.

'C-e d SPC' or 'M-x dtk-toggle-splitting-on-white-space' Toggle state of emacspeak that decides if we split text purely by clause boundaries, or also include whitespace.

'C-e d r' or 'M-x dtk-set-rate' Set speaking rate for the dectalk.

'C-e d s' or 'M-x dtk-toggle-split-caps' Toggle split caps mode. Split caps mode is useful when reading Hungarian notation in program source code.

'C-e d v' or 'M-x voice-lock-mode' Toggle Voice Lock mode (initially off). When Voice Lock mode is enabled, text is voiceified as you type it, as follows:

- Comments are spoken in `voice-lock-comment-personality`; (That is a variable whose value should be a personality name.)
- Strings are spoken in `voice-lock-string-personality`.
- Documentation strings are spoken in `voice-lock-doc-string-personality`.
- Function and variable names in their defining forms are spoken in `voice-lock-function-name-personality`.

- Certain other expressions are spoken in other personalities according to the value of the variable `voice-lock-keywords`.

'C-e d V' or 'M-x emacspeak-dtk-speak-version' Use this to find out which version of the Dectalk firmware you have.

6 Footnotes and References

6.1 JAWS

Job Access With Speech (JAWS) is a screen reader which runs under Microsoft MSDOS. It is a product of Henter-Joyce, Inc., 2100 62nd Avenue Nort, St. Petersburg, FL 33702, telephone: 800-336-5658. A demo of JAWS for DOS is available at `<ftp://ftp.hj.com/pub/jh/dosdemos/JAWS231D.EXE>`.

6.2 TELIX

TELIX is a shareware terminal emulator for MSDOS. It can be obtained by FTP from the SimTel archive [6.4]. Within the SimTel collection, look for directory msdos/telix. For example, try `<ftp://ftp.coast.net/pub/SimTel/msdos/telix>`. The latest version of the program itself is in the four files tlx322-1.zip, tlx322-2.zip, tlx322-3.zip, and tlx322-4.zip.

6.3 COMMO

COMMO is another shareware terminal emulator for DOS. In the SimTel archive [6.4], it is in directory msdos/commprog, file `commo66.zip`. For example, try `<ftp://ftp.coast.net/pub/SimTel/msdos/commprog/commo66.zip>`.

6.4 SimTel

The SimTel archive is maintained by Keith Petersen `w8sdz@Simtel.Net`. CD-ROM copies of Simtel.Net collections are available from Walnut Creek CDROM [6.6]. The primary ftp sites are `<ftp://ftp.simtel.net/pub/simtelnet>`, and `<oak.oakland.edu://pub/simtelnet>`. There are many mirror sites, as listed in the following table:

Country	Host	Directory
Australia	ftp.bhp.com.au	/pub/simtelnet
Australia	ftp.iniaccess.net.au	/pub/simtelnet
Australia	ftp.tas.gov.au	/pub/simtelnet
Austria	ftp.univie.ac.at	/mirror/simtelnet
Belgium	ftp.linkline.be	/mirror/simtelnet
Belgium	ftp.tornado.be	/pub/simtelnet
Brazil	ftp.unicamp.br	/pub/simtelnet

Canada	ftp.crc.doc.ca	/systems/ibmpc/simtelnet
Canada	ftp.direct.ca	/pub/simtelnet
Canada	ftp.synapse.net	/pub/simtelnet
Chile	sunsite.dcc.uchile.cl	/pub/Mirror/simtelnet
China	ftp.pku.edu.cn	/pub/simtelnet
Czech Republic	ftp.eunet.cz	/pub/simtelnet
Czech Republic	pub.vse.cz	/pub/simtelnet
Czech Republic	ftp.zcu.cz	/pub/simtelnet
England	ftp.demon.co.uk	/pub/simtelnet
England	ftp.mersinet.co.uk	/pub/simtelnet
England	micros.hensa.ac.uk	/pub/simtelnet
England	sunsite.doc.ic.ac.uk	/packages/simtelnet
Finland	ftp.funet.fi	/mirrors/ftp.simtel.net/pub/simtelnet
France	ftp.grolier.fr	/pub/simtelnet
France	ftp.ibp.fr	/pub/simtelnet
Germany	ftp.tu-chemnitz.de	/pub/simtelnet
Germany	ftp.uni-heidelberg.de	/pub/simtelnet
Germany	ftp.uni-paderborn.de	/pub/simtelnet
Germany	ftp.uni-trier.de	/pub/pc/mirrors/simtelnet
Hong Kong	ftp.hkstar.com	/pub/simtelnet
Hong Kong	sunsite.ust.hk	/pub/simtelnet
Italy	cis.utovrm.it	/simtelnet
Italy	ftp.unina.it	/pub/simtelnet
Japan	ftp.iij.ad.jp	/pub/simtelnet
Japan	ftp.riken.go.jp	/pub/simtelnet
Japan	ftp.saitama-u.ac.jp	/pub/simtelnet
Latvia	ftp.lanet.lv	/pub/mirror/simtelnet
Mexico	ftp.gdl.iteso.mx	/pub/simtelnet
Netherlands	ftp.nic.surfnet.nl	/mirror-archive/software/simtelnet
New Zealand	ftp.vuw.ac.nz	/pub/simtelnet
Poland	ftp.cyf-kr.edu.pl	/pub/mirror/Simtel.Net
Poland	ftp.icm.edu.pl	/pub/simtelnet
Poland	ftp.man.poznan.pl	/pub/simtelnet
Portugal	ftp.ip.pt	/pub/simtelnet
Portugal	ftp.ua.pt	/pub/simtelnet
Romania	ftp.sorostm.ro	/pub/simtelnet
Slovenia	ftp.arnes.si	/software/simtelnet
South Africa	ftp.is.co.za	/pub/simtelnet
South Africa	ftp.sun.ac.za	/pub/simtelnet
South Korea	ftp.nuri.net	/pub/simtelnet
South Korea	ftp.sogang.ac.kr	/pub/simtelnet
Sweden	ftp.sunet.se	/pub/simtelnet
Switzerland	nic.switch.ch	/mirror/simtelnet
Taiwan	ftp.ncu.edu.tw	/Packages/simtelnet

Taiwan	NCTUCCCA.edu.tw	/PC/simtelnet
Thailand	ftp.nectec.or.th	/pub/mirrors/simtelnet
US	ftp.coast.net	/pub/SimTel
US, California	ftp.digital.com	/pub/micro/pc/simtelnet
US, Illinois	uiarchive.cso.uiuc.edu	/pub/systems/pc/simtelnet
US, Mass.	ftp.bu.edu	/pub/mirrors/simtelnet
US, Michigan	oak.oakland.edu	/pub/simtelnet
US, New York	ftp.rge.com	/pub/systems/simtelnet
US, Oklahoma	ftp.ou.edu	/pub/simtelnet
US, Oregon	ftp.orst.edu	/pub/simtelnet
US, Virginia	mirrors.aol.com	/pub/simtelnet

6.5 InfoMagic

InfoMagic is at 11950 N. Highway 89, Flagstaff AZ 86004, telephone 800-800-6613 or 520-526-9565, fax 520-526-9573, email: info@infomagic.com, web: <http://www.infomagic.com>.

6.6 Walnut Creek

Walnut Creek CDROM has many useful CDROMs. They are at 4041 Pike Lane, Ste D-Simtel, Concord, CA 94520, USA. Telephone (800) 786-9907 or (510) 674-0783, or FAX (510) 674-0821. email: orders@cdrom.com. Web: <http://www.cdrom.com/>

6.7 Red Hat

Red Hat Software: telephone 800-454-5502 or 203-454-5500, fax: 203-454-2582, email: sales@redhat.com. Web: <http://www.redhat.com>.

6.8 Craftwork

CraftWork Solutions, 4320 Stevens Creek Blvd, Suite 170, San Jose CA 95129, telephone 800-985-1878, email: info@craftwork.com, web: <http://www.craftwork.com>.

6.9 Yggdrasil

Yggdrasil Computing, 4880 Stevens Creek Blvd., Suite 205, San Jose CA 95129-1024, telephone 800-261-6630 or 408-261-6630, fax: 408-261-6631, email: info@yggdrasil.com, web: <http://www.yggdrasil.com>.

6.10 Emacs for DOS

From the Emacs FAQ:

--begin quote

83: Where can I get Emacs for my PC running MS-DOS?

Recent releases of GNU Emacs 19 should compile right out of the box on PCs with a 386 or better, running MS-DOS 3.0 or later. You will need the following to compile it:

Compiler: djgpp version 1.12 maint 1 or later. Djgpp v2.0 or later is recommended, since v1.x is being phased out–if you'll have any djgpp-related problem for which there is no known solution, you are on your own when you use djgpp v1.x.

You can get the latest release of either v1.x or v2.0 by grabbing everything in the following directory (using anonymous ftp):

<ftp://ftp.coast.net/SimTel/vendors/djgpp>

There are a few directories under djgpp whose names begin with 'v1' or 'v2'; get the contents of 'v2' and 'v2gnu' (for djgpp v2) or 'v1' and 'v1gnu' (for djgpp v1).

GUnZip and Tar:

The easiest way is to use djtar which comes with DJGPP v2.0, because it can unzip .tar.gz archives on-the-fly (so you won't need twice the required disk space while untarring the archive). You get djtar with the v2djdev200.zip/ file from the above FTP server.

Another (slower) version of Tar which unzips automatically is available by anonymous ftp on this site:

<ftp://ftp.kiae.su/msdos/arcers/tar320fp.zip>

Or you can unZip the archive with the DJGPP port of GZip (from the above directory at ftp.coast.net look for v2/gzp124b.zip), then unTar it with any of the Tar ports floating around. A DOS version of GNU tar is available via anonymous ftp from

<ftp://ftp.unipg.it/pub/msdos/aspi/gtar-exe.zip>

Note that DOS ports of GNU Tar usually cannot unzip compressed archives.

Another version of Tar for DOS can be found at

<ftp://ftp.urc.tue.nl/pub/unixtools/dos>

However, be warned that not all DOS versions of tar work equally well, so you might have to try others if this one gives you trouble.

Utilities: chmod, make, mv, sed, rm.

All of these utilities are available via anonymous ftp from the site

<ftp://ftp.coast.net/SimTel/vendors/gnu/gnuish/dos_only>

You should grab the files fut312bx.zip (contains chmod.exe, mv.exe, and rm.exe).

A port of GNU Sed is available in the djgpp archives in the above directory on ftp.coast.net. Look for a file named v2/sed118b.zip or v1/sed118bn.zip.

The file etc/MSDOS in the distribution contains some information on the differences between the Unix and MS-DOS versions of GNU Emacs.

MS-DOS systems are notorious in the problems they present when installing programs, due to a great variability in both hardware and software. If you have any unusual problems compiling or using Emacs, please consult the latest version of the djgpp FAQ list, available as v2/faqNNNb.zip, where 'NNN' is the version number. For v1, get the file v1/faq102.zip.

If you would prefer not to compile Emacs by yourself, you can get binaries for Emacs via anonymous ftp from many sites; use your Archie client to search for them.

You might also be interested in Demacs, which runs under MS-DOS (*not* Microsoft Windows; see question 84) on 386- and 486-based PCs. Demacs is a port of Nemacs (see question 126), rather than a straight port of GNU Emacs 18 or 19.

Demacs was developed using an MS-DOS version of gcc called djgpp by DJ Delorie `dj@delorie.com` which can compile and run large programs under MS-DOS and under MS Windows. Demacs was derived from Nemacs rather than straight from GNU Emacs. You can get the most recent version of Demacs via anonymous ftp from `<ftp://ftp.sigmath.osaka-u.ac.jp/pub/Msdos/Demacs/>`.

For a list of other MS-DOS implementations of Emacs (and Emacs look-alikes), consult the list of "Emacs implementations and literature," available via anonymous ftp from
`<ftp://rtfm.mit.edu/pub/usenet/comp.emacs>`.

`--end quote`

6.11 GNU Mirror Sites

The GNU collection at `<ftp://prep.ai.mit.edu/pub/gnu>` is mirrored at many sites. Mirrors in USA include these:

- `<ftp://labrea.stanford.edu/pub/gnu>`
- `<ftp://wuarchive.wustl.edu/systems/gnu>`
- `<ftp://ftp.kpc.com/pub/mirror/gnu>`
- `<ftp://f.ms.uky.edu/pub3/gnu>`
- `<ftp://jaguar.utah.edu/gnustuff>`
- `<ftp://ftp.hawaii.edu/mirrors/gnu>`
- `<ftp://uiarchive.cso.uiuc.edu/gnu>`
- `<ftp://uiarchive.cso.uiuc.edu/pub/gnu>`
- `<ftp://ftp.cs.columbia.edu/archives/gnu/prep>`
- `<ftp://gatekeeper.dec.com/pub/GNU>`
- `<ftp://ftp.uu.net/systems/gnu>`

6.12 Emacspeak with Earlier Slackware Releases

If you want to install Slackware 3.0 or earlier, you will need to prepare a full null modem cable, including modem control signals.

For two DB25 (25 pin) connectors, the required connections are:

- 1 (Frame Ground) - 1 (Frame Ground)
- 2 (Receive Data) - 3 (Transmit Data)
- 3 (Transmit Data) - 2 (Receive Data)
- 4 (Request To Send) - 5 (Clear To Send)
- 5 (Clear To Send) - 4 (Request To Send)
- 6 (Data Set Ready) - 20 (Data Terminal Ready)
- 7 (Signal Ground) - 7 (Signal Ground)
- 8 (Carrier Detect) - 20 (Data Terminal Ready)
- 20 (Data Terminal Ready) - 6 (Data Set Ready)
- 20 (Data Terminal Ready) - 8 (Carrier Detect)

For two DB9 connectors, the connections are:

- 1 (Carrier Detect) - 4 (Data Terminal Ready)
- 2 (Receive Data) - 3 (Transmit Data)
- 3 (Transmit Data) - 2 (Receive Data)
- 4 (Data Terminal Ready) - 6 (Data Set Ready)
- 4 (Data Terminal Ready) - 1 (Carrier Detect)
- 5 (Signal Ground) - 5 (Signal Ground)
- 6 (Data Set Ready) - 4 (Data Terminal Ready)
- 7 (Request To Send) - 8 (Clear To Send)
- 8 (Clear To Send) - 7 (Request To Send)
- 9 (Ring Indicator) not connected

For a DB9 (listed first) to a DB25 (second), the connections are:

- 1 (Carrier Detect) - 20 (Data Terminal Ready)
- 2 (Receive Data) - 2 (Transmit Data)

- 3 (Transmit Data) - 3 (Receive Data)
- 4 (Data Terminal Ready) - 6 (Data Set Ready)
- 4 (Data Terminal Ready) - 8 (Carrier Detect)
- 5 (Signal Ground) - 7 (Signal Ground)
- 6 (Data Set Ready) - 20(Data Terminal Ready)
- 7 (Request To Send) - 5 (Clear To Send)
- 8 (Clear To Send) - 4 (Request To Send)
- 9 (Ring Indicator) not connected

Follow the installation directions above as far as booting from the boot disk and loading the root disk. At this point Linux is running on your machine.

The program that prints the login prompt is called "agetty". You will now have to reconfigure your machine so that agetty also looks for logins from a serial port. This requires typing four lines on the Linux machine keyboard, with no feedback. If you realize you have made a mistake before hitting the carriage return, you can erase it with the backspace key. First, type "root" and a single carriage return to log in (no password is needed). Next, you need to append one line to `/etc/inittab`. Type the following two lines:

```
cat >>/etc/inittab
s1:45:respawn:/sbin/agetty 9600 ttyS0
```

Finish each line with the "enter" key. Then type a control-D, which signals end of file to a Unix program. (Note: The next to last character in the second line is an upper case "S". Everything else is in lower case.) I have assumed that the connection is to the first serial port on the Linux machine, called "COM1" under DOS, or "ttyS0" under Linux. To use the second port instead, change the last item on the above line to "ttyS1".

Then type

```
init q
```

which causes the init process to reread `/etc/inittab`. At this point the DOS machine should display a login prompt (the third of the blocks of text quoted above). On the DOS machine, type `root`, and finish the installation. (The next thing you should do is create and enable a swap partition.)

Incidently, I have been able to test this only up to the point of getting the login prompt on the DOS machine. I cannot log in because I don't have a full null modem cable. (I can type "root", but don't get any further response.)

7 Frequently Asked Questions (FAQ)

7.1 Why does it say "space" after each character?

Your DECtalk Express has old firmware. Use the Emacspeak command 'C-e d V' to find out your version. You should be running a version no older than 4.2bw from March 1995. If you have an earlier version, you can find an updated version at <http://www.ultranet.com/ rongemma/tips_upd.htm>, a WWW site maintained by Ron Jemma of the Dectalk Group at DEC. Alternatively, you can send email to Anne Nelson at DEC`nelson@dectlk.enet.dec.com`. The most recent version at this writing is 4.3 release AA X01 May 20 1996.

8 Legalese

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