

RASCAL/LinuxBot QUICK START GUIDE

IMPORTANT - PLEASE READ THIS GUIDE BEFORE RUNNING THE RASCAL/LinuxBots

PRELIMINARIES

This quick start guide assumes that the user has some basic familiarity with Linux. **DO NOT ATTEMPT TO RUN THE RASCAL/LinuxBots UNLESS YOU HAVE SOME KNOWLEDGE OF LINUX.** This is especially important because many RASCAL/LinuxBot operations require you to be logged in as 'root'. As root you have full system administrator privileges, with the power to inflict (albeit unwittingly) serious damage to the operating system.

If you are new to Linux, a good starting point is the tutorial guide *DOS-Win-to-Linux-HOWTO*, available from the Linux Documentation Project at <http://www.linuxdoc.org/> (together with many other excellent HOWTO guides).

For users familiar with Linux: the RASCAL/LinuxBot hard disk system is organised as follows. A single 96Mbyte IDE compatible solid-state disk drive is mounted as the master device on the IDE interface. On a DOS/Windows system this would be the C: drive, but under Linux it is the 'hda' device. It is typically organised into one small MSDOS plus two Linux partitions, as follows:

<i>Device</i>	<i>Size</i>	<i>Purpose</i>
/dev/hda1	4Mbytes	MSDOS
/dev/hda2	80Mbytes	Linux root file system
/dev/hda3	10Mbytes	Linux swap partition

The whole of the Linux file system is mounted on /dev/hda2. The swap partition /dev/hda3 increases the size of the virtual memory space available to Linux.

A complete text based Linux operating system is installed in /dev/hda1, and occupies about 60Mbytes, leaving 20Mbytes free for robot applications. The install includes:

- A version 2.x Linux kernel

- The 'bash' command line interpreter
- All standard text based Linux commands and utilities
- Full TCP/IP networking and associated utilities
- Telnet, FTP and Web servers
- Full PCMCIA support, including support for wireless LAN cards
- Online manual ('man' pages) for all of the above
- The 'joe' (wordstar compatible) screen editor
- The Gnu C Compiler ('gcc') with all libraries and include files
- Man pages for the C Compiler, C functions, and libraries

POWERING UP

In normal operation all communication with the RASCAL/LinuxBot is via the wireless LAN so, prior to powering up any robot, ensure that a suitable wireless LAN enabled workstation is available. The workstation must have a Telnet client application available.

Start the Telnet client prior to powering up the robot.

Then, on the robot, confirm:

1. that the battery has sufficient charge for the anticipated period of operation. If the level of charge of the battery is in any doubt then replace it with a freshly charged unit. And
2. that the correct wireless LAN adapter is fitted, and fully seated into the PCMCIA adapter. The wireless LAN adapter must match the adapter fitted to the fixed workstation.

Then, power up the RASCAL/LinuxBot.

After between 90-120 seconds, the RASCAL/LinuxBot LEDs should initially switch off, and then every other LED will switch on for about 1 second, then alternate LEDs will switch on, and remain on. This indicates that the Linux boot process has completed. Check also that the power (or activity) LEDs of the robot's wireless LAN adapter now show that the adapter is active.

Now, on the Telnet client running on the fixed workstation, 'connect' to the RASCAL/LinuxBot. To do this you will need to know the robot's IP address. On connecting you should see the Linux login prompt, as follows:

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Linux 2.0.27 (rascal5) (tty0)
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rascal5 login:
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Now login, normally using your own username and password. Note, however, that to run programs which access motion controllers, sensors, etc, requires access to I/O ports. Linux limits port access to the superuser (or 'root'), so to run robot control programs you will need to either login as 'root', or use the 'su' command.

POWERING DOWN

NOTE: DO NOT UNDER ANY CIRCUMSTANCES JUST SWITCH OFF THE RASCAL/LinuxBot POWER WITHOUT FIRST GOING THROUGH THE SHUTDOWN SEQUENCE.

Like any UNIX operating system, Linux requires that an orderly shutdown sequence is performed prior to removal of power. Failure to perform this sequence is likely to cause problems with files that have not be properly closed*.

To shutdown Linux, type (as root):
rascal5# shutdown -h now

This command instructs Linux to shutdown 'now' (i.e. without delay) and then to halt the processor '-h' (which avoids the processor starting to reboot the operating system after the shutdown).

Shortly after issuing this command the telnet connection will fail (because the telnet server has been shutdown). It takes a further 20 seconds approximately for Linux to complete the shutdown process. After waiting for this period it is safe to switch off the RASCAL/LinuxBot power.

*Note that if, because of an unexpected power failure, Linux was not shutdown properly, then when next booting up Linux will automatically attempt to repair any filesystem errors caused by files remaining open when power failed. Normally these repairs completely remedy the problem and simply add a short delay to the Linux boot sequence. However, on rare occasions the filesystem repairs cannot complete automatically and manual intervention is required which require 'console' access (i.e. the connection of a keyboard, VGA card and monitor to the RASCAL/LinuxBot PC/104 stack).