

# SIGNAL Computer Specs

| <u>Component</u>  | <u>Acceptable</u>                              | <u>Recommended</u>   | <u>Notes</u> |
|---|--|--|--------------|
| <b>Required components</b>                                |  |  |              |
| Operating system  | Windows XP / Vista / Win7 / Win8               | Win7 64-bit  | 1            |
| Operating system  | 32-bit or 64-bit                               | 64-bit for computation speed   |              |
| CPU speed   |  | 3 GHz or greater   | 2            |
| CPU cores   | 1  | 2-4  | 2            |
| RAM   | 1 GB   | 4-8 GB   | 3            |
| Hard disk   | 40 GB  | 160 GB or greater  |              |
| Video   | Built-in graphics chip or add-in graphics card |  | 4            |
| Video resolution  | 800 x 600                                      | 1600 x 1200 or greater   | 4            |
| Monitor size  | 17"  | 24" or larger  | 5            |
| Removable storage   |  | DVD-RW w/ 16X write speed  | 6            |
| Computer format   | Desktop or notebook                            | <b>Tower chassis</b> required for full-size PCI slot for optional I/O board (see below).                             |              |
| <b>Optional components</b>                                |  |  |              |
| Audio sound card (general use, indep of SIGNAL I/O board) | Built-in chip                                  | Sound card with specs (bandwidth, accuracy, supported sample rates)  | 7            |
| Audio monitor speakers                                    |  | Accurate speakers with bandwidth spec  | 7            |
| SIGNAL I/O board  |  |  | 8            |
| PCI slot (desktop)  |  | <b>Full-size PCI slot</b> required for I/O board or PCMCIA adapter.  |              |
| PCMCIA slot (notebook)                                    | Type II or Type III                            | <b>Type II slot</b> required for NI-6062E card.<br><b>Type II slot + PCMCIA extender</b> required for Dart I/O card. |              |
| USB flash drive   |  |  | 9            |
| USB Zip and/or floppy drive                               |  |  | 10           |

## Notes

- SIGNAL has been tested extensively by Engineering Design with Windows XP and Windows 7, but runs with most Windows versions.
- SIGNAL computation does not use multiple CPU cores, so computational speed depends only on CPU clock speed. However, **a multi-core CPU is recommended** so Windows can use the other core while SIGNAL is crunching. SIGNAL 5 I/O is multi-threaded and **does** take advantage of multiple processors. Quad core processors have delivered the best SIGNAL computation times.
- Minimum required RAM depends on Windows version. 4 GB RAM on WinXP and 8 GB RAM on Win Vista and later are **strongly recommended**. Increasing RAM beyond those limits will **not** increase the number or size of signals that SIGNAL can handle.
- Current built-in graphics chips (such as the Intel HD4600 included with i5 and i7 CPU chips) provide excellent performance at high resolutions up to 2560x1600 over DVI or DisplayPort (**not** HDMI) video connections. Stand-alone graphics cards may provide crisper images and faster RTS scrolling, but the difference may be slight.
- Consider 24, 27 and 30 inch monitors. Quality depends on screen resolution (e.g., 1920 x 1200) and dot pitch (pixel size, where smaller is better and 0.250 mm is a good benchmark). Together these qualities make spectrograms crisp and detailed. Resolution, physical size, dot pitch and DPI (dots per inch) are mathematically related (see excellent table [http://en.wikipedia.org/wiki/Dot\\_pitch](http://en.wikipedia.org/wiki/Dot_pitch)). SIGNAL will detect screen resolution and use all of it and can open multiple screen windows side by side, so resolution and physical size both pay off.
- Make sure the DVD drive supports both DVD-RW and DVD+RW standards.
- Playing sounds accurately for audition is important. You want to hear **everything** in your recordings (even outside the band of your target material) because SIGNAL will measure it all. Your ears are your guide. There are many good sound

cards. M-Audio, who began by making studio monitors, offers good quality speakers for a few hundred dollars. In both cases, get equipment with bandwidth specs.

8. Sounds can be digitized during recording (e.g., Marantz or Sony digital recorders) or by SIGNAL's built-in I/O using an installed SIGNAL I/O board. Digital recorders are typically limited to audio bandwidth. SIGNAL built-in I/O includes the following capabilities: record and digitize beyond the audio band; SIGNAL-controlled event recordings (such as scheduled recording or direct-to-disk recording for extended duration in days or weeks); real-time experiments with SIGNAL as the experiment controller (using the SIGNAL **Experiment Maker** module). **Contact Engineering Design for hardware recommendations.**
9. USB flash drive is keychain-size and convenient for moving data between non-networked machines.
10. External Zip drives and floppy drives connected via USB can be used to read legacy media.

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