

Procedure for Installing the Comedi Device Driver into Red Hat Linux 9 for use with the Measurement Computing PCI-DAS1200 Card

Erin Mastrantonio

NRAO Technology Center, 2115 Ivy Rd., Building 4, Charlottesville, VA 22903

Abstract. This report describes the step-by-step procedure for installing the Comedi device driver into Red Hat Linux 9, kernel version 2.4.20-8. This driver is used with the PCI-DAS1200 data acquisition card manufactured by Measurement Computing.

1. Introduction

The PCI-DAS1200 data acquisition card by Measurement Computing Inc. was chosen for use in the wide-band sweep-frequency spectrometer developed for the Green Bank Solar Radio Burst Spectrometer (GB/SRBS) project. The Comedi device driver is used to control that card within the Linux computing environment. Upon upgrading from Red Hat Linux 7.2 to 9 (kernel 2.4.20-8) for GB/SRBS we encountered some difficulties installing the driver software. The following procedure was found to properly install the driver into Red Hat 9.

2. Installation Procedure

2.1. Locate Comedi Driver Files

Locate the `comedi-0.7.67.tar.gz` and `comedilib-0.7.21.tar.gz` tarballs at the comedi website ¹ and copy these files to `/usr/local/`. Also, you will need to download a patch ² for comedilib to take care of some missing sgml tags in later releases. Copy the patch to `/usr/local/` as well.

For the remainder of the steps to work, the linux kernel source files must be installed. Check whether they are present or not by typing `cd /usr/src/`. If there is a directory here with “linux” in the title, the source files are already installed and the following steps may be carried out. If not, go to System Settings under Start Here. Click on Add/Remove Applications. Under “Development”, choose the Kernel Development package click “update.” The needed directories will now appear under `/usr/src/`.

¹<http://www.comedi.org/download.php>

²<https://cvs.comedi.org/pipermail/comedi/2004-August/006253.html>

2.2. Configure the Linux Source Tree

The Linux source tree must be configured before comedi is integrated into it. Remember, all of the steps in this document must be executed as root. Below is the succession of commands to type at the shell:

- `cd /usr/src/`
If there is not already a link `linux` \Rightarrow `linux-2.4` create one by typing `ln -s linux-2.4 linux`
- `cd /usr/src/linux/configs/`
- Select a config file closest to your architecture. If you are unsure which architecture you're using, type:

```
rpm -q --qf' %{ARCH}\n' kernel
```

- If, for example, the return value is `i686` then the proper configuration file is `kernel-2.4.20-i686.config`. Copy this file to `.config` by typing: `cp -p kernel-2.4.20-i686.config /usr/src/linux/.config`
- `cd /usr/include/linux/`
- Type `uname -r` to check which kernel version is running (e.g. `2.4.20-8`)
- Edit the contents of `version.h`. Change `UTS_RELEASE` to match the results of `uname -r`, making sure to include the hyphenated portion (e.g. `UTS_RELEASE = "2.4.20-8"`).
- `cp version.h /usr/src/linux/include/linux/`
- `cd /usr/src/linux/`
- `make mrproper`
- `make oldconfig`
- Edit the Makefile; near the top, change the line `EXTRAVERSION = -8custom` to read `EXTRAVERSION = -8` (remove the word `custom`). Save and exit.
- `make dep`

2.3. Compile the Driver

Next, untar the comedi tarball and compile the comedi driver. At the shell:

- `cd /usr/local/`
`tar -xvzf comedi-0.7.67.tar.gz` (this will create the directory `comedi-0.7.67` under `/usr/local/`)

- The `remap_page_range` function contains a corruption in later releases of `comedi`. In the older releases, that function had four arguments but was supposed to have five in the newer releases. However, Redhat defaulted back to four arguments in the newer versions although the file `mm.h` does not reflect this. Therefore, make the following modification to `mm.h` to avoid errors during `make`.
- `cd /usr/local/comedi-0.7.67/include/linux/`
- `emacs mm.h`
- Replace the line `#if LINUX_VERSION_CODE < KERNEL_VERSION(2,5,0)` with `#if LINUX_VERSION_CODE < KERNEL_VERSION(2,4,20)`
- `cd /usr/local/comedi-0.7.67/`
- `./configure`
- `make` (if it works, there will be no errors)
- `make install`. This step installs `comedi.o`, `kcomedilib.o`, and `<driverfiles>.o` into `/lib/modules/<<kernelversion>>/misc/`.
- `make dev`. If this works, the output will look like the following:


```
mknod -m 666 /dev/comedi0 c 98 0
mknod -m 666 /dev/comedi1 c 98 1
mknod -m 666 /dev/comedi2 c 98 2
mknod -m 666 /dev/comedi3 c 98 3
```

2.4. Compile the Comedi User Libraries

Next, compile the `comedi` user libraries. From the shell:

- `cd /usr/local/`
`tar -xvzf comedilib-0.7.21.tar.gz` (creates the directory `comedilib-0.7.21`)
- Apply the patch mentioned in the introduction to this document. Type: `patch -p0 < comedilib-0.7.21_sgmlpatch`. If it works, the system will output the message that `comedilib.sgml`, `install.sgml`, `other.sgml`, and `tutorial.sgml` were patched (in dir `comedilib-0.7.21/doc/`).
- `cd comedilib-0.7.21`
- Type:


```
./configure --disable-ext-bindings
```

The appended option prevents `swig` and `python` errors from occurring. If successful, several `config.status` lines will appear at the end of the output.

- `make`
- `make install`

2.5. Install the Compiled Drivers and Core Comedi Modules

At the shell:

- `cd /sbin`
`./modprobe comedi` (using `modprobe` instead of `insmod` here and in the next step ensures the prevention of unresolved symbol errors during the `comedi_config` step)
- Note: if the system delivers an error that says “`modprobe: can't locate module comedi`” try typing “`depmod -a`”. That command makes a makefile that establishes proper dependencies for kernel modules. Once the dependencies are correct, the `modprobe` command should work. To see if it did work, type `lsmod`; the (unused) `comedi` module should appear at the top of the list.
- `./modprobe cb_pcidas`. Type `lsmod` and verify that the following appears:
`cb_pcidas (unused)`
`comedi_fc [cb_pcidas]`
`comedi [cb_pcidas comedi_fc]`
- `cd /usr/local/comedilib-0.7.21/`
- Lastly, run the `comedi_config` command, which configures the driver module to use a particular device file (`/dev/comedi*`) and a particular device (in this case, `cb_pcidas` for the PCI-DAS1200 card). The command is: `comedi_config /dev/comedi0 cb_pcidas`

2.6. Final Detail

At this point, upon program execution the error “Error while loading shared libraries: `libcomedi.so.0`: cannot open shared object file: no such file or directory” may result. If that is the case, type:

```
"export LD_LIBRARY_PATH=3D$LD_LIBRARY_PATH:/usr/local/lib"
```

at the shell before running the program and the error should go away. Caution: this fix must be applied every time you reboot.