

# Zoran-based Cards Video4Linux Driver Manual

Linux Media Labs

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## 1 Notational Conventions

Your input is designated with \$, for the command shell input prompt, and with # for superuser mode input. Your input and system response is presented in **bold face**.

## 2 System Requirements

- RedHat Linux 6.2, 7.2, 7.3
- Kernel 2.2.16,2.2.19, 2.2.21, 2.4.7, 2.4.16, 2.4.18, 2.4.19
- CPU 200MHz or more
- RAM 32M or more
- EIDE or SCSI-2
- Any Video card
- Video overlay mode was tested with Matrox Millenium AGP G200/G400 and other AGP cards may work

## 3 Miscelleneus

Because of the variations in Linux distributions, as well as because of quick rate of change in the shipping kernels Linux Media Labs provides drivers in source form, under the terms of Gnu General Public License (GNU GPL).

## 4 Zoran-based Cards Video4Linux Driver

### 4.1 Obtaining the Software

From <http://www.linuxmedialabs.com/lml33src/cvs/LMLCD/LML33> download the driver-zoran.tar.gz file. For example you can do it with the 'wget' utility (assuming you have you computer connected to the Internet) :

```
$ wget http://www.linuxmedialabs.com/lml33src/cvs/LMLCD/LML33/driver-zoran.tar.gz
```

Also you can find driver on LMLCD.

Untar this file:

```
$ tar zxvf driver-zoran.tar.gz
```

This would create subdirecotry **driver-zoran** that contains video4linux driver.

## 4.2 Compiling the Driver

### 4.2.1 Prepare kernel sources for driver compilation

If your kernel sources are prepared for driver compilation already (kernel config file exists and dependencies are built) you should bypass this section. Also if you Linux distribution isn't RedHat preparing kernel sources for driver compilation may be different from this. If you encountered with driver compilation problem please contact LML for technical support.

Enter superuser mode:

```
$ su -
```

Make linux symbolic link

```
# cd /usr/src/  
# ln -sf linux-2.4 linux
```

You can replace 'linux-2.4' string with any directory where your kernel sources are located.

Copy config file to kernel source tree root. Your config file name has 'i686' substring if your CPU is Intel PentiumPro or higher; it has 'i386' substring if your CPU is Intel Pentium or lower, AMD K6 or lower; it has 'athlon' substring if your CPU is AMD Athlon; it has 'smp' substring if your system has more than one CPU. For example our system has one Pentium III CPU and RedHat version 7.2 (Linux kernel version 2.4.7):

```
# cd linux/configs  
# cp kernel-2.4.7-i686.config ../.config  
# cd ..
```

Remove 'custom' word from EXTRAVERSION in Makefile with any text editor, for example we use 'vi'

```
# vi Makefile
```

Add 'smp' word to EXTRAVERSION if your system has more than one CPU.

Check that your EXTRAVERSION is exactly what follows kernel version (like 2.4.7) reported by 'uname -r' command:

```
# uname -r  
2.4.7-10
```

Make dependencies

```
# make dep
```

**HINT:** *if you are stuck with kernel configuration or you want to switch between 'smp' or 'up' configuration then do this:*

```
# cd /usr/src/linux  
# make distclean
```

*Copy kernel configuration file as described above.*

*Run kernel configuration utility:*

```
# make menuconfig
```

*and exit configuration utility immediately saving changes.*

*Make dependencies:*

```
# make dep
```

*That may help...*

## 4.2.2 Compile & install kernel modules

Go to directory with downloaded v4l driver source files, and run command sequence:

```
$ su  
# make  
# make install  
# exit
```

Before you load the driver you must have a video device at major device node 81. If you don't have it yet, do the following:

```
$ su -  
# cd /dev  
# mknod video0 c 81 0  
# ln -s video0 video
```

If you have more than one card, add more nodes in /dev directory:

```
# mknod video1 c 81 1  
# mknod video2 c 81 2  
...
```

Now you have an installed v4l driver ready to work.

## 4.3 Loading the Driver Module

You may load zoran-based v4l driver after each reboot manually, or modify the /etc/conf.modules to let this happen automatically.

To manually load the driver:

```
$ su -  
# /sbin/insmod videodev  
# /sbin/insmod i2c-old
```

If your card is LML33R10:

```
# /sbin/insmod saa7114
# /sbin/insmod adv7170
```

If your card is LML33:

```
# /sbin/insmod bt819
# /sbin/insmod bt856
```

Finally load zr36067 driver:

```
# /sbin/insmod zr36067 [optional insmod line parameters]
```

At this point you should check 10-20 last **dmesg** lines for installed driver information that should look similar to (meaningless lines deleted):

```
# dmesg | tail -n 20
LML33R10[0] card detected
LML33R10[0]: Zoran ZR36060 (rev 1)
MJPEG: 1 card(s) found
MJPEG: using 2 V4L buffers of size 128 KB
LML33R10[0]: Initializing card[0], zr=d28744e0
LML33R10[0]: Testing interrupts...
LML33R10[0]: interrupts received: GIRQ0:50 queue_state=0/0/0/0
LML33R10[0]: procs entry /proc/zoran0 allocated. data=d28744e0
```

Don't forget to exit superuser mode:

```
# exit
```

#### 4.4 How to get RedHat 7.3 working with LML33?

RedHat 7.3 distribution comes with native LML33 support (not LML33R10), but 'kudzu' utility does not provide proper **/etc/modules.conf** file configuration. That's why you need to add following lines to **/etc/modules.conf** file using **'vi /etc/modules.conf'** command in superuser mode :

```
below zr36067 bt819 bt856
```

After that build dependency tree for modules:

```
# depmod -a
```

That's all!

## 4.5 Configuring System to Load Zoran-based Cards V4L Driver Module Automatically

Go to superuser mode

```
$ su
```

Add following line to `/etc/modules.conf` (you may use vi text editor for this by typing `'vi /etc/modules.conf'`)

```
alias char-major-81 videodev  
above videodev zr36067
```

If you have one or more LML33R10 cards you must add to `/etc/modules.conf` following line:

```
below videodev saa7114 adv7170
```

If you have one or more LML33 cards you must add to `/etc/modules.conf` following line:

```
below videodev bt819 bt856
```

If you have one or more LML33R10 and one or more LML33 in single case you must add to `/etc/modules.conf` following line:

```
below videodev saa7114 adv7170 bt819 bt856
```

Build dependency tree for modules:

```
# depmod -a
```

## 4.6 Troubleshooting

If you run into any problems with the driver is helps to rebuild (and reinstall it) with debugging support turned on. Change to the driver directory and do:

```
$ make clean
```

edit first line in interested source file (for example in `zr36067.c`) - increment `DEBUGLEVEL` by 1

```
$ vi zr36067.c
```

build driver

```
$ make
```

Change to superuser mode and enable generation of debug log by editing file `/etc/syslog.conf` to have destination for debug level messages, for example: `*.=debug /var/log/debug`. After that restart `syslogd` with the following command:

```
$ /etc/rc.d/init.d/syslog restart
```

Unload `zr36067` module, move `zr36067.o` to the location you load this module from and reload `zr36067` module. You can now use:

```
$ tail -f /var/log/debug
```

to view debugging messages from the driver.

## 5 Obtaining and Installing Main Actor Software

This tool is bundled with LML33 and is not developed by Linux Media Labs.

Download the software from <http://www.mainactor.com> ("MainActor Video Editor for Linux") file name: `MainActor-3.5.1-1.i386.rpm`

```
$ su
```

to root and install it using `rpm`:

```
$ rpm -i MainActor-3.5.1-1.i386.rpm
```

Start the program using the command:

```
$ maseq&
```

Open top pull-down menu: "Help"/"Perform Registration" which brings a dialog box asking for a serial number.

Your serial number is: \_\_\_\_\_

(Please e-mail [lml@linuxmedialabs.com](mailto:lml@linuxmedialabs.com) if you did not receive the serial number).

Enter it and you now have a full version of MainActor installed on your system.

Please contact MainConcepts with problems and issues, their Web site is:

<http://www.mainactor.com>



## 6 Capture/Playback Utilities

In order to perform video capture or playback video you need video processing tools for Linux to be installed on your system. You can find it on LMLCD in directory contrib or you can get it from internet .

<http://www.linuxmedialabs.com/lml33src/cvs/LMLCD/contrib/>

In order to install video processing tools for Linux, mount LMLCD, then use the following commands:

```
$ cd /mnt/cdrom/contrib  
$ ./softwareInstall.sh
```

In order to capture video into MJPEG encapsulated into AVI file format:

```
$ lavrec -d 1 -f a -i n -t 30 -q 80 test.avi
```

where -t switch sets the size of clip to be captured in seconds, so adjust it to the amount of seconds you want to capture, -d switch sets the decimation, -f switch sets output format and video field order, -i switch selects video source (in case of capital letter S-Video input is selected, otherwise Composite input selected ) and video standard, -q sets JPEG compression level. For more details refer to lavrec man pages.

In order to playback video on output:

```
$ lavplay -p C test.avi
```

on XWindows display:

```
$ lavplay -p S test.avi
```

## 7 Creating Video-CD / SVCD using mjpegtools and VCDimager

In order to install video processing tools for Linux, mount LMLCD, then use the following commands:

```
$ cd /mnt/cdrom/contrib  
$ ./softwareInstall.sh
```

First step is to capture video into MJPEG encapsulated into AVI file format:

```
$ lavrec -d1 -fa -in -t 30 -q 80 test.avi
```

where -t switch sets the size of clip to be captured in seconds, so adjust it to the amount of seconds you want to capture

After that you can edit the resolution AVI file with MainActor video editor (maseq command) or another NLE for Linux, like Broadcast2000, Kino etc.

Second step is to separate audio stream from video stream and encode it into MP2 audio stream:

```
$ lav2wav test.avi | mp2enc -V -o aud.mp2
```

Third step is to separate video stream and encode it into MPEG1 (for VCD) or MPEG2 (for SVCD). For VCD (352x240 resolution, 30 frames/sec) use the following command:

```
$ lav2yuv test.avi | yuvscaler -o VCD | mpeg2enc -s -r 16 -o video.m1v
```

For SVCD (480x480 resolution, 60 fields/sec interlaced) use the following command:

```
$ lav2yuv -x -s 2 test.avi | yuvscaler -O SVCD | mpeg2enc -M 2 -F 3 -s -b 2500 -V 400 -o video.m2v
```

Forth step is to combine audio and video streams, for VCD:

```
$ mplex -f 1 aud.mp2 video.m1v -o video.m1s
```

or for SVCD:

```
$ mplex -f 2 aud.mp2 video.m2v -o video.m2s
```

Fifth step is to create a VCD or SVCD image that can be written to CD-R or CD-RW disk, for VCD:

```
$ vcdimager video.m1s
```

or for SVCD

**\$ vcdimager -t svcd video.m2s**

This command creates two files: videocd.bin and videocd.cue. In order to produce CD-R or CD-RW you need to use the following command:

**\$ cdrdao write -device 0,0,0 videocd.cue**

at this point you will get a disk that can be played with any software VCD/SVCD player or standalone VCD/SVCD player as well as most DVD players would play VCDs.

In order to check your clip or use computer for watching the clip use the following command:

**\$ mplayer video.m2s**

In order to playback captured AVI, with card composite video output use the following command:

**\$ lavplay -p C test.avi**

All tools mentioned have man pages with a lot of additional information on switches and modes. For example use 'man lavrec' command to find more about video capture utility.

## 8 Estimating Disk Drive Performance

In order to estimate the performance of the disk subsystem use the following command:

```
$ time dd if=/dev/zero of=/tmp/dummy.test bs=1024k count=100
```

Make sure you have at least 100Mb free on a disk drive mounted on /tmp. If you have more space available on /tmp, change to count=500 or more. Then calculate the transfer rate in Mb/sec.

For example:

```
time dd if=/dev/zero of=/tmp/dummy.test bs=1024k count=120
120+0 records in
120+0 records out
0.01user 8.99system 0:40.16elapsed 22%CPU (0avgtext+0avgdata
0maxresident)
0inputs+0outputs (199major+271minor)pagefaults 6swaps
```

That gives 120Mb / 40sec = 3 Mb/sec

If you keep in mind that a video stream of 720x480@30fps in 4:2:2 color with 1:15 compression is about 1.4 Mb/sec you can estimate if your disk subsystem has enough performance to record/playback video without frames dropped.

## 9 Using Video4Linux Uncompressed Grabbing Facilities

If you want to make full use of the Video for Linux *uncompressed* grabbing facilities, you must either

- obtain and install the "big\_physarea patch" for your kernel and set aside the necessary memory during boot time. There seem to be several versions of this patch against various kernel versions floating around in the net, you may obtain one e.g. from:  
<http://www.polyware.nl/~middelin/patch/bigphysarea-2.2.1.tar.gz>  
You also have to compile your driver AFTER installing that patch in order to get it working
- start your kernel with the mem=xxx option, where xxx is your real memory minus the memory needed for the buffers. For doing this add an entry in lilo.conf (if you use lilo): append "mem=xxxM" or add a line in your linux.par file (if you use loadlin): mem=xxxM

The second method is by far easier, however it is dangerous if more than one driver at a time has the idea to use the memory leftover by setting the mem=xxx parameter below the actual memory size.

If you use only MJPEG compressed capture provided by the driver, you should not need large memory areas for DMA. In this case, you will be able to capture and playback movies with lavtools, however you will not be able to use capture features of XawTV and other similar programs (you can still watch video on the screen).

### 9.1 Linux System Configuration

The system configuration can only be changed by the root (superuser), so you need to enter superuser mode:

```
$su -
```

**Your card requires 2MB of memory to be allocated for its use.**

**If you have more then one card then you need 2Mb of RAM reserved per card.**

Depending on the boot loader you use - LILO or GRUB (which is used by RedHat since revision 7.1) do the following:

### 9.1.1 LILO

For example if your system has 256Mb RAM then you need to edit the `/etc/lilo.conf` file by adding:

```
append = "mem=254M"
```

to the image you're booting from. If you have 96Mb you need to add `'mem=94M'` line etc. Make certain if you have smp setup, that you use the smp section of `lilo.conf`, not the linux-up section.

Here is an example of `/etc/lilo.conf` file:

```
image=/boot/vmlinuz-2.4.18-3
label=linux
append = "mem=254M"
root=/dev/hda3 initrd=/boot/initrd-2.4.18-3.img read-only
```

\*Please note, if you have more then one append string in your `lilo.conf` file, you must add your memory specifications to

the existing append string in order to avoid complications.

After that you **must** run 'lilo' command (to activate changes to your `/etc/lilo.conf`).

In order for the changes in the `lilo.conf` file to take effect **you must reboot** your system before proceeding.

### 9.1.2 GRUB

Change the line in the `/boot/grub.conf` file:

```
kernel /boot/vmlinuz-2.4.7-10 ro root=/dev/hda1,ro mem=250M
```

after reboot, that will reduce the memory size used by the kernel, leaving free memory needed by driver.