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            Elo Multiple Touchscreen Linux Driver – Single Touch Serial

                 Intel i686 (32 bit) or AMD64/Intel (64 bit)

                Installation/Calibration/Uninstallation Instructions

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                                 Version 3.4.0
                               February 24, 2015
                               Elo Touch Solutions

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Elo Linux Multiple Serial Driver package contains native Linux drivers designed for Linux kernel 2.4, 2.6, 3.x and later, video alignment utility, rotation utility and control panel utilities for Elo touchmonitors. The touch driver will support the various multi-video setup without any additional configuration. ATI Big Desktop, Nvidia Twinview, Merged Buffer, Xorg Xinerama and Xorg Separate X screens(non-Xinerama) modes are supported.

This readme file is organized as follows:

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1. Supported Touchmonitors and Elo Touchscreen Controllers
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 - All Elo Entuitive brand touchmonitors with an internal serial
   controller

 - Elo Serial Controllers (IntelliTouch(R) 2500S, 2310B, 2310, 2300, 2701S
                            CarrollTouch(R) 4000S, 4500S
                            AccuTouch(R)   2210, 2216, 2218)


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2. System Requirements
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   - 32 bit Intel i686 (x86) platform (or)    [Visit the Linux downloads section at
www.elotouch.com
     64 bit AMD/Intel x86_64 platform        to download driver package for your 32 or
64 bit Linux]

  - Kernels supported:
     Kernel version 2.4.18 and later
     Kernel version 2.6.xx
     Kernel version 3.x.xx

  - XFree86/Xorg supported:
     Xfree86 version 4.3.0
     Xorg version 6.8.2 - 7.2
     Xorg (Xserver) version 1.3 and later

  - Motif versions supported:
     Motif version 3.0 (libXm.so.3)
     Motif version 4.0 (libXm.so.4)
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3. Installing the Elo Touchscreen Serial Driver
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Important:
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a.) Must have administrator access rights on the Linux machine to
    install the Elo Touchscreen Serial Driver.

b.) Ensure all earlier Elo drivers are uninstalled from the system.
    Follow the uninstallation steps from the old driver's readme.txt
    file to remove the old driver completely.

c.) Do not extract the downloaded binary package on a Windows system.

d.) Motif 3.0(libXm.so.3) or 4.0(libXm.so.4) library is required to
    perform standard touchscreen calibration (elova) and use the
    graphical control panel (cpl). Openmotif or lesstif or libmotif
    installation packages provide the required libXm.so.3 or
    libXm.so.4 library.

Step I:

Copy the elo driver files from the binary folder to the default elo folder. Change
the permissions for all the elo driver files. These broad permissions are provided to
suit most systems. Please change them to tailor it to your access control policy and
for specific groups or users.

  a.) Copy the driver files to /etc/opt/elo-ser folder location.

        # cp -r ./bin-serial/ /etc/opt/elo-ser
```

b.) Use the chmod command to recursively set full permissions for all the
       users for the /etc/opt/elo-ser folder.(read/write/execute). These broad
       permissions are provided to suit most systems. Please change them to
       tailor it to your access control policy and for specific groups or users.

        # cd /etc/opt/elo-ser
        # chmod -R 777 *
        # chmod -R 444 *.txt


Step II:
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Install a script to invoke Elo drivers at system startup.


Redhat, Fedora, Mandrake, Slackware, Debian and Ubuntu systems:
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

Add the following two lines at the end of daemon configuration script in
"/etc/rc.local" file.

[ rc.local file might also be at location /etc/rc.d/rc.local. Use the
  "# find /etc -name rc.local" command to locate the rc.local file.]

  /etc/opt/elo-ser/setup/loadelo
  /etc/opt/elo-ser/eloser <PORTNAME1> <PORTNAME2> ...  [See Note 1 below for
<PORTNAME>]


SUSE Systems:
- - - - - - - -

Add the following two lines at the end of the configuration script in
"/etc/init.d/boot.local" file.

  /etc/opt/elo-ser/setup/loadelo
  /etc/opt/elo-ser/eloser <PORTNAME1> <PORTNAME2> ...  [See Note 1 below for
<PORTNAME>]


Note 1:
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Replace <PORTNAME> in the command /etc/opt/elo-ser/eloser <PORTNAME> with one of the
following names based on which serial ports the touch inputs are connected.

  ttyS0 : for /dev/ttyS0
  ttyS1 : for /dev/ttyS1
  ttyS2 : for /dev/ttyS2 ,etc.


Example: The modified lines for ttyS1 and ttyS2 (2 touchscreens) should be,
  ...
  /etc/opt/elo-ser/setup/loadelo
  /etc/opt/elo-ser/eloser ttyS1 ttyS2

```
   ...




Step III:
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Reboot the system to complete the driver installation process.

   # shutdown -r now




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4. Serial Driver Commandline Options and Usage
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The Serial (eloser) driver commandline options are listed below. If required, add the
necessary commandline options to the eloser
driver startup entry.

   --help                                      [ Print usage information and
available options ]

   --version                                   [ Display Serial touchscreen
driver version information ]

   --displaycoordinates                        [ Display the touch data,
corresponding to each touch, on a terminal.

                                                 Touch data consists of touch
state (Touch/ Stream/ Untouch) along

                                                 with X and Y coordinates. This
option is used for testing the

                                                 touchscreen, hence touch data is
only displayed and not sent to the

                                                 Xserver to move the mouse
pointer. ]

   --handshake                                 [ Enable hardware handshake(flow
control) for all serial ports specifed on command line ]
   <serial port name>                          [ Specify valid serial ports for
touch input like ttyS2, ttyS0, etc. ]



Usage Examples:
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   eloser --help                    [ Print this usage information ]

   eloser --version                 [ Display Serial touchscreen driver version
information ]

   eloser ttyS0                     [ Enable single touchscreen on serial port ttyS0
]
```

```
   eloser ttyS2 ttyS0              [ Enable multiple touchscreens on serial ports
ttyS2 and ttyS0 ]

   eloser --handshake ttyS1 ttyS0    [ Enable hardware handshake(flow control) and
enable serial ports ttyS1 and ttyS0]

   eloser --displaycoordinates ttyS0 [ Enable printing of touch data to a terminal for
testing the touchscreen on serial port ttyS0]
```

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5. Calibrating the Touchscreen
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Important:
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a.) Users must have read and write access to "/dev/elo-ser" and "/etc/opt/elo-ser"
directory to perform the touchscreen calibration.

b.) If the standard calibration program(elova) is not working as expected, try the
lighter version (elovaLite) instead. This utility has limited functionality but
should work properly on most window managers. The calibration verification
procedure(see Step II) is not available in elovaLite. Use the command "#
/etc/opt/elo-ser/elovaLite --help" to see the available options and usage
information.

Step I:

Run the calibration utility with root privileges from a command window in X Windows
from the /etc/opt/elo-ser directory, for a single monitor or multiple monitor setup.

```
  # cd /etc/opt/elo-ser
  # ./elova --nvram
```

The '--nvram' or '--precal' option writes the calibration data to the NVRAM on the
monitor and the configuration file on the hard disk. To perform the calibration and
update only the configuration file on the hard disk, use the command shown below.

```
  # cd /etc/opt/elo-ser
  # ./elova
```


In a multiple video setup, the calibration target(s) will be shown on the first video
screen and switch to the next video screen after a 30 second default timeout for each
target or screen. Once all the touchscreens are calibrated the data is stored in a
configuration file on the hard disk. To display the calibration targets on just one
specific video screen(example:videoscreen[1]) use the command shown below.

```
  # cd /etc/opt/elo-ser
  # ./elova --videoscreen=1
```

To change or disable the default calibration timeout for each target or screen, use the command shown below. [Timeout Range: Min=0 (no timeout), Max=300 secs, Default=30 secs]

```
# cd /etc/opt/elo-ser
# ./elova --caltargettimeout=0      [Disable the calibration timeout for all
targets and videoscreens]
# ./elova --caltargettimeout=45     [Modify the calibration timeout to 45 seconds]
```

To view a list of video and USB touch devices available for calibration, use the command shown below.

```
# cd /etc/opt/elo-ser
# ./elova --viewdevices
```

To view all the available options and specific usage for elova calibration program, use the command shown below.

```
# cd /etc/opt/elo-ser
# ./elova --help
```

Step II:

Touch the targets from a position of normal use. The calibration targets have a default timeout of 30 seconds, which can be disabled or modified using the "--caltargettimeout" commandline option. If a timeout occurs the calibration program will move on to the next available video screen.

Once the calibration is over, the new calibration values will be applied temporarily so that the calibration can be verified. A dialog box will be displayed to either accept the new calibration or to redo the calibration. The dialog box has a fixed timeout period of 30 seconds. If a timeout occurs, previous calibration values will be restored and the calibration program will move on to the next available video screen.

If the new calibration values are not acceptable, select the redo button to restart the calibration process again. The calibration values computed during the previous calibration will be discarded.

Select the accept button, if the calibration is good. The calibration data is written to the configuration file and the NVRAM based on the command line parameters. The calibration program will move on to the next available video screen. The new calibration values are available for use immediately after the calibration.

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6. Retrieving Calibration Values from NVRAM / Pre-Calibration  (Optional)
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Important:
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A valid calibration must exist in the monitor NVRAM (Non Volatile Random Access Memory) to use this function. Users must first perform a touchscreen calibration using elova or elovaLite utility and write the calibration values to the monitor NVRAM. The existing values in the NVRAM will be lost as only one set of calibration values can be stored in the NVRAM. Hence ensure that the current NVRAM calibration values can be overwritten before performing a new calibration and writing to the NVRAM.

Option I: [Manual Option]

To retrieve the calibration values from the NVRAM immediately, run the program 'eloautocalib' from a command window in X Windows from the /etc/opt/elo-ser directory. The command line option '--renew' enables the reading of the calibration values from monitor NVRAM and overwriting the current values in the configuration file on the hard disk.

```
  # cd /etc/opt/elo-ser
  # ./eloautocalib --renew
```

To view all the available options and specific usage for eloautocalib program, use the command shown below.

```
  # cd /etc/opt/elo-ser
  # ./eloautocalib --help
```


Option II: [Automatic Option]

Copy the xEloInit.sh script file present in the /etc/opt/elo-ser/setup directory to the /etc/X11/xinit/xinitrc.d/ directory. If the destination "xinitrc.d" does not exist (example: Ubuntu), edit the /etc/X11/xinit/xinitrc script file and add a line to invoke the /etc/opt/elo-ser/setup/xEloInit.sh script file.

```
  # cp /etc/opt/elo-ser/setup/xEloInit.sh /etc/X11/xinit/xinitrc.d/
```


To retrieve the calibration values from the NVRAM automatically on system startup, enable the 'eloautocalib' entry in the 'xEloInit.sh' script file located in the '/etc/X11/xinit/xinitrc.d/' directory. The eloautocalib entry is commented out by default and does not load the calibration values from monitor NVRAM. Uncomment the entry '/etc/opt/elo-ser/eloautocalib --renew' to enable reading the calibration values from monitor NVRAM and overwriting the current values in the configuration file on the hard disk during system startup.

Default: '# /etc/opt/elo-ser/eloautocalib --renew' - Does not load calibration values from NVRAM

Modified: '/etc/opt/elo-ser/eloautocalib --renew'   - Loads calibration values from NVRAM

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7. Accessing the Control Panel
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The control panel application allows the user to easily set the available driver
configuration options. After the driver package is installed, change to the
/etc/opt/elo-ser directory and run control panel application.


Important:
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Users must have read and write access to "/dev/elo-ser" folder to run the control
panel applications.


Step I:
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Run the control panel utility with root privileges from a command window in X Windows
from the /etc/opt/elo-ser directory. Motif version 3.0(libXm.so.3) or version
4.0(libXm.so.4) is required to use GUI Control Panel (/etc/opt/elo-ser/cpl).

   # cd /etc/opt/elo-ser
   # ./cpl


Step II:
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Navigate through the various tabs by clicking on them. Here is an overview of
information related to each tab.

   General   - Perform standard touchscreen calibration using elova (not elovaLite)
   Mode          - Change the touchscreen mode
   Sound         - Change Beep on Touch Parameters (Enable/Disable Beep, Beep Tone,
Beep Duration)
   Touchscreen-1  - Display data related to the Serial touchscreen 1.
   Touchscreen-2  - Display data related to the Serial touchscreen 2. (multiple
touchscreen setup)
   About         - Information about the package. Click on the Readme button to open
this readme file.


Step III:
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If Motif is not installed, use the command line version of the application to access
the control panel. Run the command line application from a command window in X
Windows from the /etc/opt/elo-ser directory.

   # cd /etc/opt/elo-ser
   # ./cplcmd




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8. Adapting Touchscreen Calibration to Video Rotation (Optional)
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Important:
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Users must setup the touchscreen rotation support using the /etc/opt/elo-ser/rotate/setup_rotation.sh script. This script must be run in normal video mode without any rotation.

Step I:

Run the setup_rotation.sh script from a command window in X Windows from the /etc/opt/elo-ser/rotate/ directory. The script will invoke elova calibration utility to perform an accurate calibration in normal video mode. It then saves this normal video mode touchscreen configuration file as /etc/opt/elo-ser/rotate/SerialConfigData_rotate_normal.Once this file is created, the touchscreen rotation feature can be used.

    # cd /etc/opt/elo-ser/rotate
    # ./setup_rotation.sh

As an option, if you like the current calibration and do not wish to run calibration utility again, you can manually copy the /etc/opt/elo-ser/SerialConfigData file and rename it as /etc/opt/elo-ser/rotate/SerialConfigData_rotate_normal. Proceed to the next step.

Step II:

Use the elorotate utility to adapt the touchscreen calibration to the current video rotation mode.

  # cd /etc/opt/elo-ser/rotate
  # ./elorotate --help   [Lists the utility description, usage and options available]
  # ./elorotate --left   [Adapts the touchscreen calibration for LEFT video rotation]
  # ./elorotate --right   [Adapts the touchscreen calibration for RIGHT video rotation]
  # ./elorotate --inverted   [Adapts the touchscreen calibration for INVERTED video rotation]
  # ./elorotate --normal   [Restores the touchscreen calibration to NORMAL video rotation]

The utility can be used to adjust the touchscreen calibration after or before the video rotation is performed using the command line options. Another option would be to use a script file (example: /etc/opt/elo-ser/rotate/elo_video_rotate.sh) to perform both the video and touchscreen rotation at the same time. Please edit the script file to suit the target system.

  # cd /etc/opt/elo-ser/rotate
  # ./elo_video_rotate left   [Rotate video and touchscreen to the LEFT]
  # ./elo_video_rotate normal [Restore video and touchscreen to normal mode]

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9. Uninstalling the Elo Touchscreen Serial Driver
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Important:
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Must have administrator access rights on the Linux machine to uninstall the Elo
Touchscreen Serial Driver.


Step I:
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Delete the script or commands that invoke Elo service at startup.


SUSE systems:
- - - - - - -
Remove the following entries created in Step II of Installation section from the
configuration script in"/etc/init.d/boot.local" file.

   /etc/opt/elo-ser/setup/loadelo
   /etc/opt/elo-ser/eloser ttyS0


Redhat, Fedora, Mandrake, Slackware, Debian and Ubuntu systems:
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

Remove the following entries created in Step II of Installation section from the
configuration script in "/etc/rc.local" file. (or "/etc/rc.d/rc.local" file)

   /etc/opt/elo-ser/setup/loadelo
   /etc/opt/elo-ser/eloser ttyS0



Step II:
--------

Delete all the elo driver files from the system.

   a.) Delete the main elo driver folder and device folders.

         # rm -rf /etc/opt/elo-ser
         # rm -rf /dev/elo-ser


   b.) Remove the elo script file "xEloInit.sh" placed in the
"/etc/X11/xinit/xinitrc.d/" directory. If the destination "xinitrc.d" does not exist
(example: Ubuntu), edit the /etc/X11/xinit/xinitrc script file and remove the line
(if present) that invokes /etc/opt/elo-ser/setup/xEloInit.sh script file.

      # rm /etc/X11/xinit/xinitrc.d/xEloInit.sh
```

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Step III:
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Reboot the system to complete the driver uninstallation process.

   # shutdown -r now




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10. Troubleshooting
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A. Hardware Check
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   To verify that the touchmonitor is connected and functioning
   correctly, type the following command in an command window
   for serial port 1 (COM1).

      # od -h -w10 </dev/ttyS0

   Similarly for serial port 2 (COM2) use,

      # od -h -w10 </dev/ttyS1

   The screen should start displaying a lot of numbers when the
   screen is touched. The standard Elo protocol data packet is
   identified by the distinctive appearance of "5455" as the
   first byte pair of a 10 byte data packet.


B. Some Linux distributions ship a software called modem-manager that
   performs auto-probing of serial ports and it causes conflicts with eloser.
   If one or some of the touchscreens are not responding to touches,
   disable modem-manager by running the following command in a command window:

      # chmod a-x /usr/sbin/modem-manager

   Restart the computer and the affected touchscreen(s) should be responding.


C. If touch is not working, check if the eloser driver is loaded
   and currently available in memory. Some Xorg Xserver versions
   terminate the touchscreen driver upon user logout. The current
   workaround in this situation is to startup the driver from
   Xwindows startup script or reboot the system.

      # ps -e |grep elo

   Check the driver log file for any errors that have been reported.

      # gedit /etc/opt/elo-ser/EloSerialErrorLog.txt

   If the driver is not present then load the driver again. Root access
```

is needed to load the driver manually. Normal users will have to
restart the system so that the eloser daemon is loaded again during
system startup. Normal users may be able to load the driver manually
depending on access control and file permissions that are setup.

```
# sudo /etc/opt/elo-ser/setup/loadelo
# sudo /etc/opt/elo-ser/eloser ttyS0 ttyS1   [modify serial ports as needed]
```

D. If starting the Elo touchscreen driver from the normal startup
   locations like rc.local or boot.local does not work, first test
   if the touchscreen is working by manually launching the driver
   from a terminal window within XWindows GUI.

```
# sudo /etc/opt/elo-ser/setup/loadelo
# sudo /etc/opt/elo-ser/eloser ttyS0 ttyS1   [modify serial ports as needed]
```

   If the touchscreen works when the driver is launched manually,
   try to add the touchscreen driver startup line to the end of
   one of the XWindows startup scripts. The Xwindows startup scripts
   are located usually in the following path /etc/X11/xinit/xinitrc.d/.
   Running the touchscreen driver from the Xwindows startup script
   will provide touch input ONLY after the user has logged in
   successfully at the GUI Login screen.

E. Beep-on-touch feature does not work in the GUI control panel sound tab
   (Beep Test button) or if the driver is loaded manually from a non-root
   user context. The driver has to be loaded from a system startup script
   or root user account for beep-on-touch to function properly. The beep
   on touch feature also depends on the pcspkr(PC Speaker) kernel module.

F. While trying to load the driver manually, if you get an error
   "Error opening SERIAL_ERROR_LOG_FILE", check the file permissions for
   the /var/log/elo-ser/EloSerialErrorLog.txt file. The user needs to have
   read and write access to this log file to launch the driver. Try to login
   with root user privileges and then load the driver manually.

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11. Contacting Elo Touch Solutions
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Website: http://www.elotouch.com

E-mail: customerservice@elotouch.com

Mailing Address:

  Elo Touch Solutions Inc
  1033 McCarthy Blvd.
  Milpitas, CA 95035

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  USA

  Phone:    (800) 557-1458
            (408) 597-8000
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