



# Troubleshooting SunPCi™ II CD-ROM access problems

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<http://www.sun.com/desktop/products/sunpci/>

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# Introduction

This article describes how the SunPCi™ software uses the workstation CD-ROM device under the Solaris™ Operating Environment (OE). It also describes, in greater detail, how to debug problems when Microsoft Windows can't see the CD-ROM. The intent of this article is to give the reader sufficient background to be able to understand how it works and how to debug it when it doesn't work. If you are only interested in debugging problems with CD-ROM access, and are familiar with the Solaris OE CD-ROM workings, then jump right down to the *debugging CD-ROM access* section.

As is the case with all standard PC peripherals, the SunPCi software needs to map the SPARC™ CD-ROM to a CD device under Microsoft Windows. This mapping needs to be available in DR-DOS, for Microsoft Windows setup, as well as for normal operation when Microsoft Windows is running.

In "real mode" (DR-DOS), this mapping takes place using the SunPCi software real mode redirector. This is what allows `R:\cdrom\cdrom0` to exist. This is not a DR-DOS based CD-ROM device driver however. It is only a simple redirector mapping to allow file system level access to the CD from which to run Windows setup.

Once Microsoft Windows is running, there is a Windows driver that translates Windows CD-ROM requests to Solaris OE based SCSI commands and other I/O control functions. Examples of these commands these CD eject, CD play audio and CD read. After Microsoft Windows is running, the real mode CD-ROM mapping (`R:\cdrom\cdrom0`) is no longer needed.

## The Solaris OE CD-ROM device.

The Solaris OE treats all CD-ROM devices as SCSI devices. This is even true on systems where the device IDE drive. How can this be, you ask? Because the IDE command set is a subset of SCSI and the translation, or emulation if you prefer, is easy enough. What this means to the SunPCi software is that it doesn't treat a SCSI device any differently than an IDE device.

Every identified device has an entry in `/dev/rdisk` in the format of `/dev/rdisk/c0tXd0sY` where 'X' is the SCSI ID and 'Y' is the partition (or "slice" as it's called).

## The Volume Manager.

The Volume Manager is a Solaris OE daemon which is responsible for the detection, mounting and creation of the symbolic links so that all you see is `/cdrom/cdromX` where 'X' is an enumerated value. The first cdrom will be `cdrom0`, the second `cdrom1`, etc.

Other important links that the volume manager creates are the `/vol/dev/aliases` links. Like the `/cdrom` links, there will be one for `cdrom0`, `cdrom1`, etc. It is these device links the SunPCi software opens when a CD is inserted.

The volume managers configuration file is `/etc/vold.conf`. A typical file (Solaris 8 OE version) looks like this:

```
# Database to use (must be first)
db db_mem.so

# Labels supported
label cdrom label_cdrom.so cdrom
label dos label_dos.so floppy rmdisk pcmem
label sun label_sun.so floppy rmdisk pcmem

# Devices to use
use cdrom drive /dev/rdisk/c*s2 dev_cdrom.so cdrom%d
# The next line is commented out to disable Floppy Volume
Management for SunPCi
```

```

#use floppy drive /dev/rdiskette[0-9] dev_floppy.so floppy%d
use pcmem drive /dev/rdisk/c*s2 dev_pcmem.so pcmem%d
forceload=true
use rmdisk drive /dev/rdisk/c*s2 dev_rmdisk.so rmdisk%d

# Actions
eject dev/diskette[0-9]/* user=root /usr/sbin/rmmount
eject dev/dsk/* user=root /usr/sbin/rmmount
insert dev/diskette[0-9]/* user=root /usr/sbin/rmmount
insert dev/dsk/* user=root /usr/sbin/rmmount
notify rdisk/* group=tty user=root /usr/lib/vold/volmissing -p
remount dev/diskette[0-9]/* user=root /usr/sbin/rmmount
remount dev/dsk/* user=root /usr/sbin/rmmount

# List of file system types unsafe to eject
unsafe ufs hsfs pcfs udfs

```

Note that the SunPCi installation script comments the “use floppy” line out. This is because the SunPCi software needs raw access to the floppy. No other changes are made to this file.

Also note that if you change `/etc/vold.conf`, you must either reboot the workstation or restart the volume manager as in:

```

# /etc/init.d/volmgt stop
# /etc/init.d/volmgt start

```

## Removable Media Mounter.

The removable media mounter (`rmmount`) is a utility that is controlled by the Volume Manager whenever a CD-ROM is inserted or removed. The `rmmount` configuration file is `/etc/rmmount.conf`

The most interesting thing about `rmmount` is that it is responsible for delivering CD state change information to registered software packages. SunPCi receives this notification by installing an `rmmount` shared library in `/usr/lib/rmmount` and adding a reference to that library into `/etc/rmmount.conf`.

If you examine `rmmount.conf` (with the SunPCi software properly installed), you will find that a Solaris 8 OE version of this file looks similar to this:

```

# File system identification
ident udfs ident_udfs.so cdrom floppy rmdisk
ident hsfs ident_hsfs.so cdrom
ident ufs ident_ufs.so cdrom floppy rmdisk pcmem
ident pcfs ident_pcfs.so floppy rmdisk pcmem

# Actions
action cdrom action_sunpci.so
action cdrom action_filemgr.so
action floppy action_filemgr.so
action rmdisk action_filemgr.so

# Mount
mount * hsfs udfs ufs -o nosuid

```

The action lines tell `rmmount` which shared libraries want to be called when a volume has been mounted (inserted) or unmounted (removed). If `action_sunpci.so` does not exist in `/usr/lib/rmmount` OR the entry is missing from `rmmount.conf` file, the CD-ROM will not be seen in Microsoft Windows because the SunPCi software will not receive the insert notification.

# Assumptions and limitations.

## The Default CD-ROM device.

A fresh install of the SunPCi software will assume a CD-ROM device alias of `/vol/dev/aliases/cdrom0`. If the CD-ROM in your system is not this value, you must change it in the SunPCi software user interface item "attach CD-ROM".

This value ends up in the SunPC.ini file as this entry:

```
[Drives]
CD=/vol/dev/aliases/cdrom0
```

## Number of CD-ROMs supported.

The SunPCi software will only support one CD-ROM device per session. It does not matter how many devices are installed and functioning correctly under the Solaris OE. You must choose one or assume the SunPCi software default of `/vol/dev/aliases/cdrom0`. Note that this can present problems if you use the same SunPC.ini file (the default) on different machines that have different cdrom configurations. Fortunately, most of the time the cdrom is `/vol/dev/aliases/cdrom0`.

## CD-ROM behavior when running multiple SunPCi cards.

If you have multiple SunPCi cards running and you insert a CD, you will notice that autorun will start in every running SunPCi session (under Microsoft Windows). This is normal because the SunPCi software shares the CD-ROM access with all other system software, even itself.

## DVD-ROMs

The SunPCi software does support DVD-ROM access on systems that support a DVD-ROM drive. However, access is limited to **CD data only**. The SunPCi software will not play a DVD movie.

## CD Audio

When you insert an audio CD, you can play the disc using the Microsoft Windows CD player (for example). However, you may notice that the audio won't play on your workstation speakers. Not all workstations route the CD-ROM audio to the workstation audio inputs.

In all SunPCi installations, audio will not play on speakers connected to the audio out on the SunPCi card. This is because there is no audio connection between the CD-ROM and the SunPCi card. If there is a headphone jack on the front of the CD-ROM drive, you can plug in headphones there to hear CD audio.

# Debugging CD-ROM Access Problems.

Had enough background? Ok, let's discuss how to debug problems when the CD-ROM doesn't work under Microsoft Windows (all supported versions). Here are the critical items to check and, within reason, the order in which they should be checked.

## Does the CD function under the Solaris OE?

When you insert a CD, does the Solaris OE filemanager start and does the CD get automounted as `/cdrom/cdromX`? If not, then the SunPCi software may not see it either.

Hard mounting the CD may also render it inaccessible to the SunPCi software. If you cannot get the CD to function with the Solaris OE filemanager then you may want to first try a reconfiguration boot as in:

```
# uadmin 2 0
Ok boot -r
```

## Check `/etc/vold.conf`

Check that the volume manager is running and that `/etc/vold.conf` looks similar to the one listed above. I have seen customers comment out sections of `vold.conf` that cause the CD not to be seen by the SunPCi software.

## Check `/etc/rmmount.conf`

Make sure that the line 'action cdrom action\_sunpci.so' is in the file and that it is the FIRST entry. Events are called in a chained fashion and a shared library can fail to pass notification down to the other shared libraries. Making sure that the `action_sunpci.so` entry is at the top of the list will remove the possibility of that happening.

## Check the `/vol/dev/aliases` links.

Is there more than one? Does that agree with what is in the SunPCi software user interface or in the `SunPC.ini` file? With a CD inserted, it should look something like this:

```
$ ls -l /vol/dev/aliases

lrwxrwxrwx   cdrom0 -> /vol/dev/rdisk/c0t6d0/w2sfpp_en
```

Note: When you eject the CD, the link in `/vol/dev/aliases` disappears as does the `/cdrom/cdromX` mount. Not that it matters to the SunPCi software, but also note that the SCSI ID of this CD-ROM drive is 6 as indicated by the `t6` in the device name.

## Stale volume information left in the `/cdrom` directory.

We see this in the lab from time to time. For unknown reasons, old volume mounts can be left in `/cdrom`. If you look in `/cdrom`, there should only be 2 entries in the directory as in this example (assuming one cdrom with a Win2k Server CD inserted):

```
tadpole 132 ls -l /cdrom

lrwxrwxrwx   1 root nobody   11 Jul 20 19:37 cdrom0 -> ./w2sfpp_en
dr-xr-xr-x   2 root sys      616 Dec  7 1999 w2sfpp_en
```

The cdrom0 link points to the volume label for the CD and that is normal. We have seen previous volume directories remain in /cdrom (possibly after a system panic). When this happens, CD-ROM access can become confused, generally resulting in the CD not being visible in Microsoft Windows. Restarting the volume manager does not correct this problem. The volume manager must be stopped, the stale directories manually removed and the volume manager restarted.

## Scratched or Dirty CDs.

The most amazing problems can happen when a CD is scratched or dirty. These problems include:

- The CD not being recognized.
- The CD being identified as an audio CD under Microsoft Windows.
- Blue Screens accessing the CD under Microsoft Windows.
- DLL errors accessing the CD under Microsoft Windows.

Please take the time to inspect, and clean, the CD.

As a simple test to see if **all** of the data can be read off a CD, do this:

```
cat /vol/dev/aliases/cdrom0 > /dev/null
```

Then look for errors in the terminal window and the system console. If there are no errors, all of the data can be read from the CD.

## When all the above looks ok, enable CD state change trace output.

The SunPCi software environment variable STATEVERBOSE, when set, will cause the program to display CD state change information in the launch window. You must set this variable before starting SunPCi. The following example is what you will see with STATEVERBOSE set. The example also assumes the following sequence:

- There is no CD in the drive.
- Start the SunPCi software.
- Insert a CD into the drive.
- Wait until the CD is mounted.
- Eject the CD.

Sample output:

```
$ setenv STATEVERBOSE 1
$ /opt/SUNWspci2/bin/sunpci
Opening a SunPCi window...
ChangeState: The CD is removed and the device is closed. do nothing
ChangeState: The CD is removed and the device is closed. do nothing
Registering Driver Event: Fd: 3, Op: 13
SCSI_DEVLOAD_IOCTL processed!
```

**<authors note: inserting the CD here>**

```
ChangeState: The CD is inserted and the device is closed. Opening
SCSI_VOLCHANGE_IOCTL Posting Media Change Interrupt
```

**<authors note: ejecting the CD here>**

```
ChangeState: The CD is removed and the device is open. closing
SCSI_VOLCHANGE_IOCTL Posting Media Change Interrupt
```

As you see from the trace, When the SunPCi software starts with no CD inserted, it does nothing because the CD is removed and the device is closed. When a CD is inserted, the event propagates up from action\_sunpci.so to the SunPCi software. When the SunPCi software sees the insertion event, it opens the CD-ROM device. The reverse happens when a CD is ejected.

This trace output will show you if the SunPCi software is processing these state changes correctly. If this also looks normal then there may be a problem on the Microsoft Windows side (though most CD access problems are a result of a Solaris OE configuration problem).

## Known Problems and Issues.

This section lists the known CD-ROM access problems in the SunPCi software.

### Missing insertion events.

From time to time, the SunPCi software may miss a CD insertion event (we don't know why yet). This generally happens when you start the SunPCi software with a CD in the drive. Ejecting the CD and reinserting it usually causes the CD to appear under Microsoft Windows.

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