



EUROPEAN SOUTHERN OBSERVATORY

Organisation Européenne pour des Recherches Astronomiques dans l'Hémisphère Austral

Europäische Organisation für astronomische Forschung in der südlichen Hemisphäre

# VERY LARGE TELESCOPE

FIERA CCD Controller

Software Maintenance Manual

Doc.No. VLT-MAN-ESO-13640-1707

Issue 4.0

Date 14/12/05

Prepared C.Cumani, A. Balestra, 14/12/05  
.....  
Name Date Signature

Approved D. Baade  
.....  
Name Date Signature

Released A. Moorwood  
.....  
Name Date Signature



### Change Record

Issue/Rev.	Date	Section/Page affected	Reason/Initiation/Document/Remarks
1.0	10/11/98	All	First issue
1.1	17/02/01	Chapter 2 Chapter 3 Chapter 4 Chapter 5 6.1 7.1.3	New chapter about VLTSW upgrades on SPARC New chapter about SPARC Hard Disk backup New chapter about the Spare SPARC New chapter about TIM board usage New paragraph about installation problems fcdTimTest.sh manpage added
1.2	03/04/01	Chapter 2	Various corrections to installation procedures
1.3	31/03/04	2.1.1.1 2.1.1.2 2.1.1.3 2.1.1.4 2.1.2 5 5.3.2 5.3.3 5.4.5 5.4.7.2	SLCU HD partition modified Reference to old DSP boards deleted Setting of ACC_HOST corrected “halt” and “reboot” updated Point 11: HD dump procedure simplified Removed Chapter regarding TIM module Memory allocation failure (CCSDBSHM) added Shared memory segment allocation failure added SLCU poweroff added Only one partition in SLCU HD
4.0	14/12/05	1.3 1.5 2  2.5 3  5.1.2 5.8 5.8.1 5.8.2 6	Versions of applicable documents updated TAT acronym definition added Chapter scope better described, containing also OS reinstallation/upgrades TAT test chapter added No more DAT tapes for backup hard disk preparation Paragraph on SPARC not booting added Chapter renamed Paragraph on RTD problems Paragraph on shared memory problems fcdDump removed



<b>1</b>	<b>INTRODUCTION</b>	<b>7</b>
1.1	Purpose	7
1.2	Scope	8
1.3	Applicable Documents	8
1.4	Reference Documents	8
1.5	Abbreviations and Acronyms	9
1.6	Glossary	10
1.7	Stylistic Conventions	10
1.8	Naming conventions	10
1.9	Problem Reporting/Change Request	10
<b>2</b>	<b>- FIERA SLCU OS/VLTSW REINSTALLATION OR UPGRADES</b>	<b>11</b>
2.1	Complete upgrade of the SPARC (including OS)	11
2.1.1	Upgrade of the "Master" SLCU	12
2.1.2	Upgrade of the Instrument SLCUs	15
2.1.3	Last configuration steps for the Instrument SLCUs	18
2.2	OS patches	20
2.2.1	Upgrade of the "Master" SLCU	21
2.2.2	Upgrade of the Instrument SLCUs	21
2.3	Upgrade of the VLROOT only	21
2.3.1	Upgrade of the "Master" SLCU	21
2.3.2	Upgrade of the Instrument SLCUs	21
2.4	CCD Camera Installation Verification	22
2.5	TAT tests	22
<b>3</b>	<b>SPARC HARD DISK BACKUP</b>	<b>23</b>
<b>4</b>	<b>PREPARING THE SPARE CPU SPARC TO REPLACEMENT</b>	<b>25</b>
<b>5</b>	<b>TROUBLESHOOTING</b>	<b>27</b>
5.1	Problems during installation	27
5.1.1	How to change a Hard Disk with SCSI-3 into SCSI-0	27
5.1.2	SPARC does not boot	27
5.2	Problems with start-up	27
5.2.1	FIERA S/W stays in OFF state	28
5.2.2	FIERA S/W Goes to LOADED but refuses to go to STANDBY or ONLINE	30
5.3	Software starts but exposure status goes to FAIL	32
5.3.1	Failure to lock down the exposure memory	32
5.3.2	Failure to allocate the exposure memory	32
5.3.3	Failure to allocate shared memory segment	32
5.4	Rebooting/restarting the SLCU	32
5.4.1	Remote reboot using OLDB environment	33
5.4.2	Remote reboot using only operating system	33
5.4.3	Remote halt followed by reset or power cycle	33
5.4.4	Local halt followed by reset or power cycle	33

5.4.5	SLCU power off . . . . .	33
5.4.6	Hard reset or power cycle . . . . .	34
5.4.7	When the SLCU refuses to communicate over the network even after reboot . . .	34
5.5	Running FIERA sequence checker. . . . .	34
5.6	Running detector head electronics diagnostics . . . . .	35
5.6.1	Cabling between DSP and VME interface board is incorrect (or broken). . . . .	35
5.6.2	Non existent board (or board dead) . . . . .	36
5.6.3	Analogue bias board not reaching desired voltage . . . . .	36
5.6.4	SIMM on clock driver board missing or dead. . . . .	36
5.6.5	Preamp disconnected or failed . . . . .	36
5.7	PULPO trouble shooting . . . . .	37
5.7.1	Check the PULPO configuration . . . . .	37
5.7.2	Check basic communication with the PULPO unit . . . . .	38
5.7.3	PULPO control . . . . .	38
5.8	Problems with Image Display . . . . .	40
5.8.1	Problems with Real-Time Image Display . . . . .	40
5.8.2	Problems with shared memory allocation . . . . .	41
<b>6</b>	<b>REFERENCE</b>	<b>43</b>
6.1	Maintenance utilities . . . . .	43
6.1.1	fcdlWhat . . . . .	44

# 1 INTRODUCTION

The software described in this manual is intended to be used in the ESO VLT project by ESO and authorized external contractors only.

While every precaution has been taken in the development of the software and in the preparation of this documentation, ESO assumes no responsibility for errors or omissions, or for damage resulting from the use of the software or of the information contained herein.

## 1.1 Purpose

This document is the Maintenance Manual of the FIERA CCD Controller Software. It is intended to provide people who want to do software maintenance operations to a FIERA CCD controller with all the necessary information.

The manual assumes that the reader has experience with astronomical CCD detector systems. It is not intended to be an introduction to CCD detector systems, and therefore it uses terminology common to this field (e.g. pixel, binning, readout, frame-transfer chip, etc.) without further explanations (for these see [5], [19] and [20]).

The manual also assumes that the reader has significant experience with the FIERA CCD Controller. In particular the Installation and Configuration of the FIERA Software is assumed to have been already performed (see [5]).

In addition to the **Introduction**, this manual contains the following chapters:

**FIERA SPARC Update:** how to install a new version of the VLTSW on a FIERA SLCU.

**FIERA SPARC Hard Disk Backup:** procedures to be followed to perform proper backup of the hard disk of a FIERA SPARC.

**Trouble-shooting:** list of already encountered problems and description of the possible reasons and solutions.

**Reference:** manual pages of some diagnostic programs.

The following table presents the complete list of documents available about the FIERA CCD Controller software, together with a summary of the contents and the category of users who may be interested in reading them.

Document #	Title	Contents	Users
VLT-SPE-ESO-13640-1315	FIERA CCD Controller - System Requirements	FIERA System Requirements	ODT HW and SW developers
VLT-SPE-ESO-13640-1266	FIERA CCD Controller - Software Functional Specifications	FIERA SW Requirements	ODT SW engineers

Document #	Title	Contents	Users
VLT-MAN-ESO-13640-1388	FIERA CCD Controller - Software User Manual	Software Installation Programmatic interface	Responsible for VLTSW installation VLT Instrument Software developers
VLT-SPE-ESO-13640-1387	FIERA CCD Controller - Software Design (in preparation)	FIERA SW description	ODT SW engineers
VLT-VER-ESO-13640-1389	FIERA CCD Controller - Software Acceptance Test Plan (in preparation)	FIERA SW tests	ODT SW engineers

## 1.2 Scope

The present document is intended to be used for scientific CCD detector systems based on the FIERA Controller.

## 1.3 Applicable Documents

The following documents, of the exact issue shown, form a part of this document to the extent specified herein. In the event of conflict between the documents referenced herein and the contents of this document, the contents of this document shall be considered as a superseding requirement.

- [1] VLT-PRO-ESO-10000-0228, 1.0 10/03/93 ---- VLT Software Programming Standards
- [2] VLT-SPE-ESO-17212-0001, 3.0 30/01/04 ---- VLT Instrumentation Sw Specification
- [3] VLT-SPE-ESO-17240-0385, 3.0 30/01/04 ---- INS Common Software Specification
- [4] GEN-SPE-ESO-19400-0794, 2.0 21/05/02 ---- ESO Data Interface Control Document
- [5] VLT-SPE-ESO-13640-1388, 4.0 14/12/05 ---- FIERA CCD Controller, Software User Manual
- [6] VLT-ICD-ESO-17240-19400, 2.4 06/11/96 ---- ICD between VCS and VLT Archive System

## 1.4 Reference Documents

The following documents contain additional information and are referenced in the text. The document versions are the ones defined in the VLT Common Software distribution to which the present document belongs.

- [7] VLT-MAN-ESO-17200-0642 ---- VLT Common Software, Installation Manual
- [8] VLT-MAN-ESO-17200-2238 ---- VLT Common Software, Combined OS Installation Manual
- [9] VLT-MAN-ESO-17200-0888 ---- VLT Common Software Overview
- [10] VLT-MAN-ESO-17200-0981 ---- VLT Problem Report Change Request User Manual
- [11] VLT-MAN-ESO-17210-0619 ---- VLT CCS User Manual
- [12] VLT-MAN-ESO-17210-0707 ---- On Line Database Loader User Manual
- [13] VLT-MAN-ESO-17210-0690 ---- Graphical User Interface User Manual
- [14] VLT-MAN-ESO-17240-0637 ---- INS Common Sw - dxf User Manual



- [15]VLT-MAN-ESO-17240-0726 ---- INS Common Sw - slx User Manual
- [16]VLT-MAN-ESO-17240-0853 ---- INS Common Sw - oslx User Manual
- [17]VLT-MAN-ESO-17240-0866 ---- INS Common Sw - rtd User Manual
- [18]VLT-MAN-ESO-17240-0725 ---- INS Common Sw - pco User Manual
- [19]VLT-SPE-ESO-13640-1315 ---- FIERA CCD Controller, System Requirements
- [20]VLT-SPE-ESO-13640-1266 ---- FIERA CCD Controller, Software Functional Specifications
- [21]TMS320C4x C Source Debugger ---- Texas Instruments

## 1.5 Abbreviations and Acronyms

The following abbreviations and acronyms are used in this document:

ACE	Array Control Electronics
ATM	Asynchronous Transfer Mode
CCD	Charge-Coupled Device
CCS	Central Control Software
CDT	Command Definition Table
CPU	Central Processing Unit
DAT	Digital Audio Tape
DCL	Device Control Library
DCS	Detector Control Software
DDS	Digital Data Storage
DMD	Data Management Division
ESO	European Southern Observatory
FDDI	Fiber Distributed Data Interface
FIERA	Fast Imager Electronic Readout Assembly
FITS	Flexible Image Transport System
HW	Hardware
INS	Instrumentation Software Package
I/O	Input/Output
LAN	Local Area Network
LCU	Local Control Unit
MIDAS	Munich Image Data Analysis System
N/A	Not Applicable
OLDB	On-Line DataBase
RMS	Root Mean Square
RTAP	Real Time Application Program
RTD	Real Time Display
SCCD	Scientific CCD
SLCU	SPARC Local Control Unit

SPARC	Scalable Processor Architecture
SW	Software
TAT	Tools for Automated Testing
TBC	To Be Clarified
TBD	To Be Defined
TCS	Telescope Control Software
TIM	Time Interface Module
TRS	Time Reference System
UIF	(Portable) User Interface (Toolkit)
VLT	Very Large Telescope
VME	Versa Module Eurocard
WAN	Wide Area Network
WS	Workstation

## 1.6 Glossary

No special definition is introduced in this manual.

## 1.7 Stylistic Conventions

The following styles are used:

**bold** in the text, for commands, file names, etc. as they have to be typed.

*italic* in the text, for parts that have to be substituted with the real content before typing.

teletype for examples.

<name> in the examples, for parts that have to be substituted with the real content before typing.

The **bold** and *italic* styles are also used to highlight words.

## 1.8 Naming conventions

This implementation follows the naming conventions as outlined in [2].

## 1.9 Problem Reporting/Change Request

The form described in [10] shall be used.

## 2 - FIERA SLCU OS/VLTSW REINSTALLATION OR UPGRADES

The installation of a new version of the VLTSW on the FIERA SLCU can be performed in two different ways, depending if the Operating System (OS) has to be reinstalled/ upgraded or not.

The case which requires the installation/upgrade of the OS is the most complex one, and requires direct access to the different Instrument SLCUs, while the installation of the VLTSW without the upgrade of the OS can be performed logging remotely from another computer.

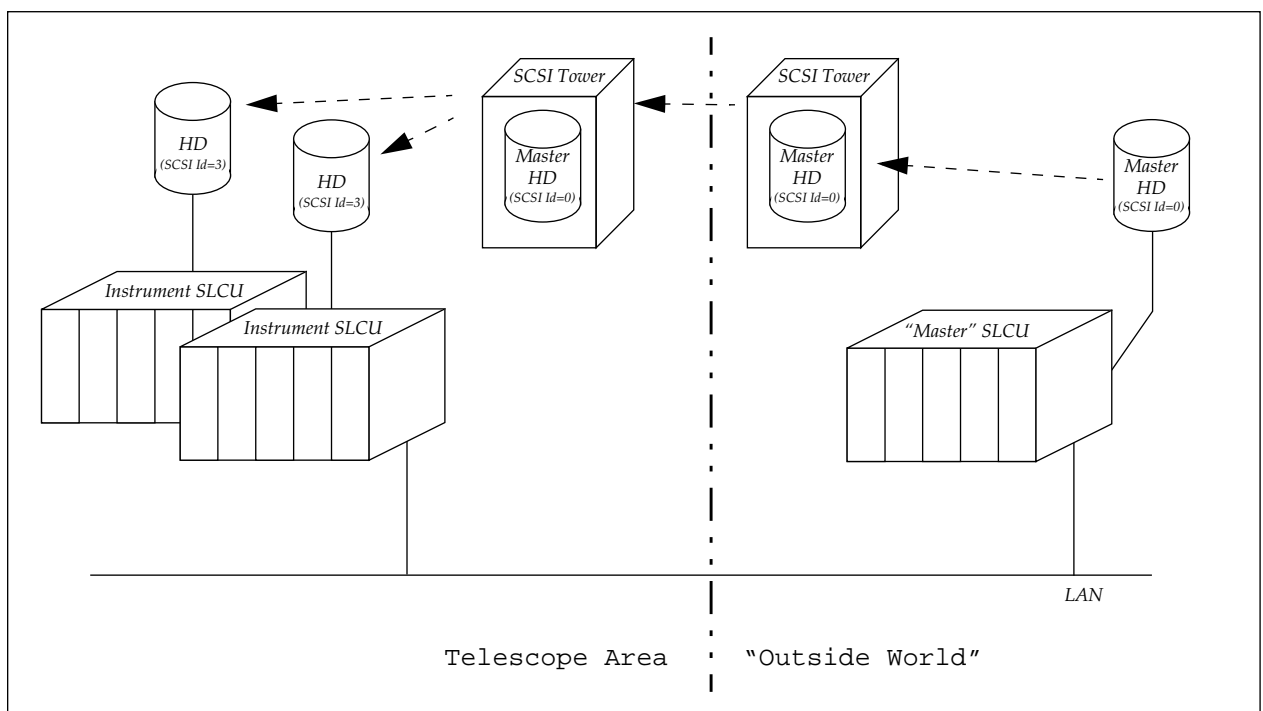
In the following paragraphs, the different procedures are described.

**IMPORTANT:** knowledge of system management is required to be able to go through the whole procedures successfully.

### 2.1 Complete upgrade of the SPARC (including OS)

Whenever an upgrade of the Operating System of the FIERA SLCU is required, the installation is performed in two steps:

- first on a “ Master”Hard Disk, connected via SCSI to a “ Master”SLCU;
- this “ Master”Hard Disk is then used to upgrade the Hard Disks of all the other FIERA SLCUs (the “ Instrument”SLCUs).



## 2.1.1 Upgrade of the “Master” SLCU

### 2.1.1.1 Upgrade of the Operating System

Preparation:

- Before starting the upgrade of the Operating System, collect the following information:
  - a. IP address and hostname of the “ Master”SLCU
  - b. IP address of the default router
  - c. Check whether your system uses ATM or ethernet. If ATM is used, you need to know also the LECS ATM address and the ELAN name for your system.
  - d. IP address and name of the xntp server
  - e. IP address and hostname of the ACC\_HOST

Actions:

1. To upgrade the Operating System, follow the steps described in [8], using the following information:
  - When partitioning the Hard Disk, use the following values:

Part <sup>(a)</sup>	Tag <sup>(a)</sup>	Flag <sup>(a)</sup>	Size (MB)
0	root	wm	<total space> - 1000
1	swap	wu	1000
2	backup	wm	<total space>
3	unassigned	wm	0
4	unassigned	wm	0
5	unassigned	wm	0
6	unassigned	wm	0
7	unassigned	wm	0

**Tab. 1 - FIERA SLCU partition table**

a. as shown by the “format” command

- on the Instrument SLCUs only the local `/etc/hosts` file is used to resolve the hostnames (no NIS, no DNS!)
- When configuring NFS, since `/diska` is not defined, substitute `/export/home` to `/diska` when creating the symbolic links for `/vlt`, `/vltdata`, `/data`. Then only one entry is required in `/etc/dfs/dfstab`:

```
share -F nfs -o rw=localhost /export/home
```

**NOTE:** it’s not necessary to define the `insroot` and `introot` directories defined in [8].

2. At the end of the installation, edit the `/etc/hosts` file, adding the complete hostname of the SLCU, the IP address and hostname of the ACC\_HOST computer, the IP address and hostname of the xntp server.

The file `/etc/hosts` should then look like the following (with the appropriate names and IP addresses):

```
#
# Internet host table
#
127.0.0.1      localhost
134.171.196.19 wflccd.pl.eso.org wflccd  loghost
# ACC_HOST in Paranal
134.171.224.2  wgsops.pl.eso.org wgsops
# xntp server in Paranal
134.171.224.144 ogstime.pl.eso.org ogstime
```

3. Install the OS patches, if needed, as described by the Notes of the VLTSW Release under distribution.

### 2.1.1.2 Installation of drivers for the FIERA SLCU

Specific code for the FIERA SLCU is available in the CDROM labelled "FIERA SPARC Configuration Code"<sup>1</sup>.

To install the drivers for the SLCU follow what is described in the file `fcdsys/src/README` on the CDROM.

### 2.1.1.3 VLTSW Installation

Actions:

1. To install the VLTSW, follow what is described in [7], performing in addition the following steps **at the end of the PECS installation**:

- a. as "root", edit the file

```
$PECS_ROOTDIR/releases/$PECS_RELEASE/etc/locality/apps-$HOST.env
```

uncomment the line:

```
VLTSW_CCSTYPE=lite
```

add the following line:

```
SOFTWARE_ROOTS=
```

- b. as "pecsmgr", install the FIERA related pecs files:

```
> cp <VLTSW>/FCD/FCD/fcdsys/templates/apps-FIERA.env \
$PECS_ROOTDIR/releases/$PECS_RELEASE/etc/locality/apps-$HOST.env
```

---

1. The contents of the CDROM are archived in the `fcdsys` module

```
> chmod 644 \
$PECS_ROOTDIR/releases/$PECS_RELEASE/etc/locality/apps-$HOST.env
```

Edit the file

```
$PECS_ROOTDIR/releases/$PECS_RELEASE/etc/locality/apps-$HOST.env
```

modifying the definitions of RTAPENV, CCDNAME and INS\_ROOT appropriately.

Edit the file

```
$PECS_ROOTDIR/releases/$PECS_RELEASE/etc/locality/apps-all.env
```

modifying the definition of ACC\_HOST appropriately.

#### 2.1.1.4 Final Common Configuration

1. Check the configuration of the shared memory.

If needed, modify as "root" the configuration of the shared memory in /etc/system:

```
set shmsys:shminfo_shmmax=128000000
```

(As a rule of thumb, the system needs a quantity of memory which is at least twice the dimensions of the CCD installed in the camera, and shminfo\_shmmax must reflect this. Apart from special cases, the value shown above is the one used in the common FIERA systems)

2. Install the "Fiera cleanup" program.

**NOTE:** Since you are doing the installation as vltmgr, become root typing "su root" (not "su - root") in order to keep the definition of VLTRoot.

As "root":

```
> cp $VLTRoot/bin/fcdboot /etc/init.d
> chmod +x /etc/init.d/fcdboot
> ln -s /etc/init.d/fcdboot /etc/rc2.d/S99fcdboot
```

3. Test the connections with the DSP.

Run:

```
> fcdHalloDsp
```

The following reply should appear:

```
Your FIERA DSP says: Hallo World !
```

4. Add the "fcdrun", "halt" and "reboot" users

Perform the following steps while logged in as "root".

- a. Edit the file /etc/passwd adding lines like:

```
fcdrun:x:0:1:::/export/home/fcdrun:/bin/bash
halt:x:0:1:Halt user:::/usr/sbin/shutdown -i5 -g0 -y
```

```
reboot:x:0:1:Reboot user:::/usr/sbin/shutdown -i6 -g0 -y
```

- b. Edit the file /etc/shadow adding lines like:

```
fcdrun::11022::::
```

```
halt::11022:::~::~:
reboot::11022:::~::~:
```

- c. Create the home directory for the `fcdrun` user and populate it:

```
> mkdir /export/home/fcdrun
> su - fcdrun
> /etc/pecs/bin/pecssh mklinks -i
```

Reply:

```
PECS_ROOTDIR [/etc/pecs]: "return"
PECS_RELEASE [000]: "return"
[...]
Do you wish to install VUE support files? [y]: "n"
```

```
> exit
> su - fcdrun
> zcat $VLTROOT/templates/forFCD/FieraTemplateUser.tar.gz | \
tar xf -
> chmod +x ~/bin/*
```

- d. Correct the prompt for the `fcdrun` user, adding the following lines to the file

```
~fcdrun/.pecs/misc-all.env:
SAVED_PS1="\h $USER:\w \! > "
PS1="\h $USER:\w \! > "
```

**NOTE:** In order for CCSLite to function correctly, **the user `fcdrun` must be defined on the Instrument Workstation<sup>1</sup>** (although it is neither necessary that the same user id is used on the Instrument Workstation and the FIERA SLCU, nor that the `fcdrun` user has a home directory on the Instrument Workstation).

### 2.1.2 Upgrade of the Instrument SLCUs

Preparation:

- Before starting the upgrade of the Instrument SLCU, collect the following information:
  - a. IP address and hostname of the Instrument Workstation
  - b. name, id and group of "Instrument User", the user which runs the FIERASW on the Instrument Workstation
  - c. name of the OnLine Database Environment on the Instrument SLCU
  - d. name of the RTAP Environment on the Instrument Workstation
- Hardware needed:
  - a. ASCII terminal.

---

1. This is valid for CCS\_Lite on HP-UX 11

- b. Serial cable with a special connector for the Instrument SLCU (one 26 pins connector that goes to two normal serial connectors, labelled as TTYA and TTYB).
- c. SCSI tower containing the " Masterhard disk" (external HD, scsi id 0), tape device and a CD-ROM drive.
- d. Note: the internal HD of the Instrument SLCU has scsi id 3.
- e. SCSI cable.
- f. Power extension.
- g. Trolley to carry all these items to the instrument at the telescope.

Action:

1. From any telescope machine, log into the Instrument SLCU as "halt".
2. Wait a couple of minutes and then turn off power of the FIERA cabinet.
3. Connect the SCSI tower to the closest SCP.
4. Open the front cover of the FIERA cabinet. Connect the SCSI tower to the SCSI connection on the front panel of the SPARC, using the SCSI cable listed above.  
**IMPORTANT:** Be extremely careful when connecting to the SPARC.
5. Remove the cable that is connected to the serial connector at the front panel of the SPARC (labelled as "SERIAL A/B"). Connect the serial cable listed above. to the "SERIAL A/B" connector and the other side to the terminal using the cable labelled as "TTYA".
6. Turn on the SCSI tower and then the FIERA cabinet.
7. Interrupt the boot procedure<sup>1</sup>.
8. Check that both the internal and the " Masterhard disks are recognized using "probe-scsi" at the ok prompt. If ok, then boot the Instrument SLCU from the " MasterHD", typing "boot disk3"(disk0 = scsi id 3; disk3 = id 0).
9. Login as root.
10. Check the partition table of the Hard Disk of the Instrument SLCU (using the command "format"). If it differs form the one of the " MasterHard Disk (see Tab. 1), change the partitions of the Hard Disk of the Instrument SLCU (c0t3d3) using "format", according to the Tab. 1. Don't forget to do "label"before quit!

```
> format
Searching for disks...done

AVAILABLE DISK SELECTIONS:
    0. c0t3d0 [...]
Specify disk (enter its number): 0

FORMAT MENU:
    disk          - select a disk
```

---

1. Depending on the terminal, you can type "break", or "ctrl-break", or "shift-break", or "ctrl-\\" (ctrl-backslash) or "<enter>" followed by "~" and "ctrl-break", or any terminal-dependent key combination which sends a "break" to the serial port (The corresponding combination on the SPARC console is "Stop-A")



```

.....
quit

format> par

PARTITION MENU:
    0      - change `0' partition
.....
quit

partition> pri

Current partition table (original):
[...]
partition>
partition> quit
.....
format> quit

```

11. Dump the contents of the " Master'SLCU Hard Disk into the Instrument SLCU Hard Disk (Only partition 0 must be dumped, *not 1 and 2!*):

```

# newfs /dev/rdisk/c0t3d0s0
# mount /dev/dsk/c0t3d0s0 /mnt
# ufsdump 0f - /dev/rdisk/c0t0d0s0 | (cd /mnt;ufsrestore xf -)
# fsck -y /dev/rdisk/c0t3d0s0
# umount /mnt

```

- 12.**IMPORTANT:** Correct the file /etc/vfstab on the Instrument SLCU Hard Disk:

```

# mount /dev/dsk/c0t3d0s0 /mnt
# vi /mnt/etc/vfstab

```

Modify all the "t0" in " t3"and save

```

# umount /mnt

```

**NOTE:** if you forget this step, or do it wrong, the SLCU cannot reboot!

13. When the procedure is finished, halt the machine ("su - halt").
14. At the "ok" prompt type "boot disk0".
15. If needed, modify the shmsys:shminfo\_shmmax entry in /etc/system
16. Edit /etc/hosts: correct the SLCU hostname and IP address, add the hostname and IP address of the Instrument Workstation
17. Edit /etc/defaultrouter: correct the IP address of the defaultrouter, if needed. The format of the contents of this file should be:

```

WWW.XXX.YYY.254

```

where WWW.XXX.YYY are the first three numbers of the SLCU IP address (WWW.XXX.YYY.ZZZ)

18. Edit `/etc/nodename`: correct the SLCU hostname
19. Edit `/etc/hostname.le0`: correct the SLCU hostname
20. Edit `/etc/netmasks`: correct it, if needed. The format of the contents of this file should be:
 

```
WWW.XXX.0.0      255.255.255.0
```

 where `WWW.XXX` are the first two numbers of the SLCU IP address (`WWW.XXX.YYY.ZZZ`)
21. `mv \`  
`$PECS_ROOTDIR/releases/$PECS_RELEASE/etc/locality/apps-<msslcu>.env \`  
`$PECS_ROOTDIR/releases/$PECS_RELEASE/etc/locality/apps-$HOST.env`  
 where `<msslcu>` is the name of the Master SCLU
22. `mv \`  
`$PECS_ROOTDIR/releases/$PECS_RELEASE/etc/locality/misc-<msslcu>.env \`  
`$PECS_ROOTDIR/releases/$PECS_RELEASE/etc/locality/misc-$HOST.env`  
 where `<msslcu>` is the name of the Master SCLU
23. Edit `$PECS_ROOTDIR/releases/$PECS_RELEASE/etc/locality/misc-$HOST.env`  
 and modify the definition of the variables `RTAPENV`, `CCDNAME` and `INS_ROOT`

Now the machine is ready to be accessed remotely.

24. Type `"su - halt"`.
25. Power off the FIERA cabinet.
26. Power off the SCSI tower.
27. Disconnect the SCSI cable and the serial cable.
28. Connect back the original serial cable to the Instrument SLCU.
29. Power on the FIERA cabinet.

Check that the machine is accessible from the network and continue the configuration.

### 2.1.3 Last configuration steps for the Instrument SLCUs

On each FIERA SLCU:

1. Set access rights for `fcdrun` user

As `"fcdrun"` user edit the file `~fcdrun/.rhosts` (create it if it does not exist yet). It should contain one line looking like:

```
<InsWs> +
```

**NOTE:** Replace `<InsWs>` with the Instrument Workstation name.

2. Add the `"Instrument User"` user

The `"Instrument User"` is the user which runs the FIERASW on the Instrument Workstation. It must be defined also on the SPARC SLCU, with the same user id and group.

Perform the following steps while logged in as `"root"`. In the example below, replace `"IUser"` with the Instrument User name.

- a. Edit the file `/etc/passwd` adding a line like:

```
IUser:x:<IUser_id>:<IUser_grp>:::/export/home/IUser:/bin/bash
```

**NOTE:** Replace <IUser\_id> and <IUser\_grp> with the user id and group for the Instrument User from the Instrument Workstation /etc/passwd file.

- b. Edit the file /etc/shadow adding a line like:

```
IUser::11022:::~:~:
```

- c. Create the home directory for the user:

```
> mkdir ~IUser
```

- d. Change ownership of the files of the " Instrument User":

```
> chown -R IUser:<IUser_grp> ~IUser
```

- e. Populate the home directory of the " Instrument User" user:

```
> su - IUser
```

```
> /etc/pecs/bin/pecssh mklinks -i
```

Reply:

```
PECS_ROOTDIR [/etc/pecs]: "return"
```

```
PECS_RELEASE [000]: "return"
```

```
[...]
```

```
Do you wish to install VUE support files? [y]: "n"
```

```
> exit
```

```
> su - IUser
```

```
> zcat $VLTROOT/templates/forFCD/FieraTemplateUser.tar.gz | \
tar xf -
```

```
> chmod +x ~/bin/*
```

### 3. Generation of the OnLine Database

- a. Check that the environment is known to the ACC database: lookup the Online Database environment host

```
> fcdEnvToHost wmyfiera
```

A reply with the FIERA SLCU host name should appear:

```
myfiera
```

If the utility does not answer with the name of the SLCU host, there is a problem with the ACC Database. In this case, check that the value of the environment ACC\_HOST is pointing at the host with the correct ACC database. If this value is incorrect check the setting in the file \$PECS\_ROOTDIR/releases/\$PECS\_RELEASE/etc/locality/misc-\$HOST.env.

- b. As "root" modify the file /etc/services, adding the (local) OLDB environment of the Instrument LCSU and the (remote) OLDB environment of the Instrument Workstation. Do that adding the following lines:

```
<RTAPENV> <PORT1>/tcp
```

```
<InsWsEnv> <PORT2>/tcp
```

Substitute <RTAPENV> with the name of the local environment, <InsWsEnv> with the name of the remote Instrument Workstation environment, <PORT1> and <PORT2> with the numbers of the ports used for the tcp connections (ask the System Administrator for them)

- c. Check the definition of RTAPRUNNER in /etc/rtap.conf (it should be vltmgr)

- d. Configure the SLCU to log messages onto the Instrument Workstation:

edit the file `/etc/syslog.conf` while logged in as "root", adding the following lines

```
# =====
# The following three lines configure the VLT logging system
# =====
#*info;mail,local1,local2.none    /var/adm/messages
#local1.warning                   /vltdata/tmp/logFile
#local2.warning                   /vltdata/tmp/logAuto
*.info;mail,local1,local2.none   @myws
local1.warning                   @myws
local2.warning                   @myws
```

Substitute the instrument workstation hostname for "myws". This change will take affect after rebooting the SLCU.

**IMPORTANT:** use tabs for spacing!

- e. As "vltmgr":

Create the file `$VLTDATA/config/CcsEnvList` putting the following lines :

```
<RTAPENV>    /export/home/vltdata/ENVIRONMENTS/<RTAPENV>
<InsWsEnv> <InsWs>
```

Substitute `<RTAPENV>` with the name of the local environment, `<InsWsEnv>` with the name of the remote Instrument Workstation environment, `<InsWs>` with the name of the remote Instrument Workstation

- f. As "vltmgr"r un:

```
> export CCDWENV=<InsWsEnv>
> fcdinsInstall
```

Substitute `<InsWsEnv>` with the name of the remote Instrument Workstation environment.

- g. Verify that the environment has been generated:

```
> dbRead "@${RTAPENV}:<alias>${CCDNAME}.date"
```

The following reply should appear:

```
BYTES value =
```

#### 4. Installation of the Instrument Configuration File and CCD clock patterns

No installation of Instrument Configuration File and CCD clock patterns is needed on the Instrument SLCU, since the Instrument SLCU mounts the `INS_ROOT` from the Instrument Workstation via nfs (see [5]).

## 2.2 OS patches

TBD

### 2.2.1 Upgrade of the "Master" SLCU

TBD

### 2.2.2 Upgrade of the Instrument SLCUs

TBD

## 2.3 Upgrade of the VLTROOT only

In the case of the only upgrade of the \$VLTROOT (i.e., a VLTSW delivery where neither Operating System update nor OS patches installation is required), the VLTSW installation can be performed on the " Master'SLCU, then the \$VLTROOT can be copied (e.g., tar'd and ftp'd) on the Instrument SLCUs.

### 2.3.1 Upgrade of the "Master" SLCU

Generate the new VLTSW on the " Master'SLCU, performing the steps described in 2.1.1.3.

### 2.3.2 Upgrade of the Instrument SLCUs

Distribute the new VLTROOT contents to all the Instrument SLCUs:

1. Copy the \$VLTROOT directory into the Instrument SLCU (tar'ing the \$VLTROOT)
2. Check that the following files have the permission and ownership set as following:

```
-rwsr-xr-x  root  $VLTROOT/bin/ccsScheduler*
-rwsr-xr-x  root  $VLTROOT/bin/msgServer1*
-rwsr-sr-x  vltmgr $VLTROOT/bin/wpQueryData*
-rwsr-sr-x  vltmgr $VLTROOT/bin/wpSendToArchive*
```

If this is not the case, as "fcdrun", set the file properties:

```
chown root  $VLTROOT/bin/ccsScheduler
chmod u+s  $VLTROOT/bin/ccsScheduler
chown root  $VLTROOT/bin/msgServer1
chmod u+s  $VLTROOT/bin/msgServer1
chown vltmgr $VLTROOT/bin/wpQueryData
chmod u+s  $VLTROOT/bin/wpQueryData
chown vltmgr $VLTROOT/bin/wpSendToArchive
chmod u+s  $VLTROOT/bin/wpSendToArchive
```

3. Regenerate the environment, being the user defined as RTAPRUNNER in /etc/rtap.conf:

```
> vccEnvStop -e $RTAPENV
> cd $VLTDATA/ENVIRONMENTS/$RTAPENV/db1
> make clean db
```

```
> vccEnvInit -e $RTAPENV  
> vccEnvStart -e $RTAPENV
```

## **2.4 CCD Camera Installation Verification**

See the corresponding paragraph in [5].

## **2.5 TAT tests**

A set of TAT tests are archived in the `fcDms` module (retrieve it running `cmmCopy fcDms`). In order to run them, refer to the `README` file in the `test` subdirectory of the module.

### 3 SPARC HARD DISK BACKUP

Like any other FIERA Controller part, a spare Hard Disk must exist for the FIERA SPARC of each Instrument for the replacement in case of failure.

The spare Hard Disk must contain an exact copy of the contents of the SPARC Hard Disk installed on an Instrument: for this reason **the Spare Hard Disk must be updated every time the Instrument SPARC Hard Disk contents are modified (e.g., a VLT Software upgrade).**

The backup Hard Disk can be prepared using `ufsdump` on the second hard disk of the SPARC (see 2.1.2 for reference).





## 4 PREPARING THE SPARE CPU SPARC TO REPLACEMENT

The SPARC CPU board of the “*Dump Workstation*” described in Chapter 6 can be used as a spare SPARC to replace a failing one.

Before the replacement, the spare SPARC has to be reconfigured to boot from the SCSI device with the Id equal to 3. To do this:

1. run the spare SPARC in “bootmonitor” mode, pressing “STOP A” if a Graphic Monitor is used, or the “Break”key if a VT100 is used;
2. change the boot-device environment variable:

```
setenv boot-device disk0
```

The spare SPARC can then be halted and powered off, and its CPU board installed on the Instrument SPARC.



## 5 TROUBLESHOOTING

This section provides a summary of possible failures, explanation of their probable cause and procedures to recover normal operating condition.

*This section will evolve in time on the base of user experience and problems reports.*

### 5.1 Problems during installation

This section of the troubleshooting guide copes with problems which could arise during the installation procedures.

#### 5.1.1 How to change a Hard Disk with SCSI-3 into SCSI-0

If a Hard Disk with SCSI id 0 is not available, it is possible to modify the SCSI id of a Hard Disk with SCSI id 3 (e.g., one of the backup Hard Disks):

1. Build the SCSI chain using the SCSI-3 disk that has to become SCSI-0 and another disk which SCSI address is set to " 0". This disk is used only to force the system to build the device file, the content is not touched and therefore can be any disk.
2. Power the system and get the "ok" prompt (<stop>-<a>)
3. Boot from the disk SCSI-3 forcing the system to rebuild the device files (option "-r"):

```
ok> boot disk0 -r
```

4. When the system is up, edit the /etc/vfstab replacing address 3 with 0. The line should therefore look like:

```
/dev/dsk/c0t0d...
```

instead of

```
/dev/dsk/c0t3d....
```

5. Shutdown: `su - halt`
6. Switch off and remove the jumper from SCSI-3 disk to set it to SCSI-0. Remove the SCSI-0 disk used in the first part or set it to " 3" by inserting the jumpers.
7. Power on and boot from SCSI-0

#### 5.1.2 SPARC does not boot

If the following error occurs at booting:

```
Can't open boot device
```

check if the hard disk could has the SCSI Id 0 and - in case - correct it (This situation is most probably going to happened after the installation of a spare Hard Disk).

### 5.2 Problems with start-up

This section of the troubleshooting guide assumes that the installation has already been performed successfully and that the problems encountered are those of a previously running system which now fails.

### 5.2.1 FIERA S/W stays in OFF state

Some of the possible causes of the FIERA S/W to remain in the OFF state after the start-up script has been run are listed below:

#### 5.2.1.1 SLCU not alive or remote SLCU environment not started

If the SLCU has failed to boot or the SLCU environment not started the FIERA S/W would remain at the OFF state and the output in the logMonitor should resemble the following:

```
logUserData      fcdDcsStart starting for vimosa in wodt2
logUserData      fcdDcsWarmStart starting for vimosa
fcdDcsWarmStart  starting processes on odt2
msgSend          rtWaitForAck 10 9987    1 W rtE_ENV_NOT_ACTIVE: Remote env not
active REASON > No acknowledgement from env wodt2
msgSend          msgSetFilter.c 24 9987    2 W ccsERR_ENV_NOT_ACTIVE : Environment
wodt2 not active
msgSend          rtWaitForAck 10 9988    1 W rtE_ENV_NOT_ACTIVE: Remote env not
active REASON > No acknowledgement from env wodt2
```

#### 5.2.1.2 SLCU not alive

From the INstrument workstation type the following:

```
% ping odt2 (substitute with your SLCU hostname)
```

The output should resemble the following:

```
PING odt2.hq.eso.org: 64 byte packets
64 bytes from 134.171.12.206: icmp_seq=0. time=1. ms
64 bytes from 134.171.12.206: icmp_seq=1. time=1. ms
64 bytes from 134.171.12.206: icmp_seq=2. time=1. ms
64 bytes from 134.171.12.206: icmp_seq=3. time=1. ms
64 bytes from 134.171.12.206: icmp_seq=4. time=0. ms
```

If you do not receive any packet from the remote host this implies either

1. the network connection to the SLCU is broken
2. the SLCU has crashed

You should be able to determine if [1] is the case by trying to access other machines on the sub-net. If you are sure the network is OK, then go to the SLCU and reset it using the reset switch on the front panel, if the SLCU continues not to boot then look at section 5.3.2.

#### 5.2.1.3 SLCU environment not started

Assuming that the SLCU has booted and you are able to "ping" it, try the following from the INstrument workstation:

```
% msgSend $CCDLENV cmdManager PING ""
```

The output should resemble the following:

```
MESSAGEBUFFER:
```

OK

If instead of the above message you get an indication that the environment is not active try restarting the SLCU (see 5.3.2).

If the OLDB environment still does not start, log into the machine as the user *fcdrun*. Type the following to look for OLDB processes.

```
fcdrun% ps -ef | grep edu
```

The output should resemble the following:

```
vltmgr 372 1 0 Feb 20 ? 0:15 ccsScheduler -e wodta2a
```

If the *ccsScheduler* is not amongst the processes listed examine the contents of the file

```
$VLTDATA/ENVIRONMENTS/$RTAPENV/.ccsScheduler.log
```

This gives the startup messages for the OLDB environment. If this file does not contain any obvious error messages, check the contents of

```
/etc/rtap.conf
```

This contains the OLDB startup user.

#### 5.2.1.4 Communication with DSP fails

In this situation, the FIERA S/W would stay in the OFF state. The logMonitor output would resemble the following

```
fcdSlcuStartupCamera:: Executing on host odt6
fcdSlcuStartupCamera:: INTROOT /home/fieradev/INTROOT_SUN_OCT98, RTAPENV wodt6
fcdSlcuStartupCamera:: INS_ROOT /home/fieradev/INS_ROOT_OCT98 DEBUG_LEVEL
fcdSlcuStartupCamera:: CCDNAME naos, INS_USER SYSTEM,
fcdSlcuStartupCamera:: INS_HOST odt6, OP_MODE 2
fcdSlcuStartupCamera:: Checking environment
fcdSlcuCheckEnv:: SUCCESS
fcdSlcuCleanCamera:: Removing old processes ....
fcdSlcuStartupCamera:: loading database for naos
fcdSlcuSetupCamera:: Building list of camera names
fcdSlcuSetupCamera:: Built list of camera names naos
fcdSlcuSetupCamera:: Loading data base for naos
fcdSlcuSetupCamera:: Loaded
fcdSlcuSetupCamera:: complete
.
.
fcdSlcuStartupCamera:: Starting tis for naos logging to /tmp/tis.log.3738
fcdSlcuStartupCamera:: Starting fcdc40srv_sparc_link for naos logging to /tmp/
fcdc40srv_sparc_link.log.3738
fcdSlcuStartupCamera:: Trying to PING the DSP code fcddspb.app
fcdC40.C:315 301 215 1 W fcdERR_GENERIC : fcdc40 failed to initialise connection.
fcdSlcuStartupCamera:: Failed to PING the C40
cdSlcuStartupCamera:: Killing process tis id 4030
fcdSlcuStartupCamera ERROR:: Failed to kill the process tis, not cleaned up
```

If this error occurs, attempt a complete power cycle on the SLCU rack (see [5.3.2]). If the startup still fails then the error is with one of:

1. The SLCU itself
2. The DSP board
3. The VME interface board (either LSI or Benner board)
4. Cabling between VME Interface board and DSP board

See section [5.6] for a description of standalone electronics diagnostics.

### 5.2.1.5 Corrupted FIERA configuration

If the FIERA configuration has been corrupted, the FIERA S/W will stay in the OFF state with the following type of output in the logMonitor.

```
fcdSlcuStartupCamera:: Trying to PING the DSP code fcddspb.app
fcdSlcuStartupCamera:: DSP interface initialised
fcdSlcuStartupCamera:: Starting fcdexp for naos logging to /tmp/fcdexp.log.7392
cdSlcuStartupCamera:: Starting fcdcon for naos logging to /tmp/fcdcon.log.7392
ROCESS STARTING fcdexp 2.41.
fcdSlcuStartupCamera:: Starting fcdint for naos logging to /tmp/fcdint.log.7392
fcdexp      Read FIERA configuration.
fcdexp      Failed to read sequences configuration.
fcdexp      Cannot read FIERA configuration.
fcdexp      fcdexp failed to initialise.
fcdexp      fcdFIERA_CONFIG.C:107 301 334    1 W fcdERR_GENERIC : Failed to Get Se-
sequence config.
fcdexp      fcdEXP_MAIN_TASK.C:189 302 334      2 W fcdERR_GENERIC_STR : Could not
Read FIERA Config from /home/fieradev/INS_ROOT_OCT98/SYSTEM/COMMON/CONFIGFILES/
naos.
fcdexp      fcdExp.C:87 301 334              3 W fcdERR_GENERIC : fcdexp Failed to Ini-
tialise.
fcdSlcuStartupCamera ERROR:: SLCU Processes did not start up
```

This should only occur if someone has been modifying the readout sequence. In this case you should run the standalone configuration checking program (see section [5.5]).

## 5.2.2 FIERA S/W Goes to LOADED but refuses to go to STANDBY or ONLINE

Some of the possible causes of the FIERA S/W to refuse to go ONLINE are listed below:

### 5.2.2.1 Detector electronics switched off, or fibre disconnected

In this situation, the FIERA S/W would go to the LOADED state but would fail in the transition from LOADED to STANDBY or ONLINE. The logMonitor output would resemble the following

```
logUserData      fcdSlcuStartupCamera:: LCU Processes Loaded
logUserData      fcdSlcuStartupCamera:: complete
fcdexp           Init.
fcdexp           Initialise C40 interface.
fcdexp           Read and Download FIERA config.
fcdexp           Download H/W configuration.
```

```

fcdexp          Download voltage tables.
fcdexp          Initialise detector head.
fcdexp          Failed to initialise detector head.
FITS_LOG 13:42:32      /UNFORSEEN: Failed to Initialise Detector Head Electronics
[WFOV]
    
```

In this case check the fiber cables between the DSP board and the Detector Head Electronics, and ensure that the Detector Head Electronics is properly powered up. You can also run the standalone Detector Electronics Selftest S/W see section [5.6].

### 5.2.2.2 Detector electronics selftest failure

In this situation, the FIERA S/W would go to the LOADED state but would fail in the transition from LOADED to STANDBY or ONLINE. The logMonitor output would resemble the following

```

logUserData      fcdSlcuStartupCamera:: LCU Processes Loaded
logUserData      fcdSlcuStartupCamera:: complete
fcdexp           Init.
fcdexp           Initialise C40 interface.
fcdexp           Read and Download FIERA config.
fcdexp           Download H/W configuration.
fcdexp           Download voltage tables.
fcdexp           Initialise detector head.
fcdexp           Perform H/W selftest.
fcdexp           Failed H/W selftest.
fcdexp           Could not Download FIERA Config.
FITS_LOG         /UNFORSEEN: Detector Head Electronics H/W Selftest Failed [odt6]
    
```

Look at the section [5.6] for instructions on running Detector Head Electronics diagnostics.

### 5.2.2.3 PULPO controller failure or RS232 communication failure

In this situation, the FIERA S/W would go to the LOADED state but would fail in the transition from LOADED to STANDBY or ONLINE. The logMonitor output would resemble the following

```

logUserData      fcdSlcuStartupCamera:: LCU Processes Loaded
logUserData      fcdSlcuStartupCamera:: complete
fcdexp           Init.
fcdexp           Initialise C40 interface.
fcdexp           Read and Download FIERA config.
fcdexp           Download H/W configuration.
fcdexp           Download voltage tables.
fcdexp           Initialise detector head.
fcdexp           Perform H/W selftest.
fcdexp           Failed H/W selftest.
fcdexp           Download sequences.
fcdexp           Sequence download complete.
fcdexp           Sending command INIT to fcdint_naos.
fcdint_naos      Initialising PULPO controller.
fcdint_naos      cannot read from TTY, 3 retries
fcdint_naos      failed to set PULPO into CTRL Mode
    
```

See section [5.7] for a description of PULPO troubleshooting.

### 5.3 Software starts but exposure status goes to FAIL

Some of the possible reasons for exposure failure are listed below:

#### 5.3.1 Failure to lock down the exposure memory

If the "readout.percent" database attribute gets to some value > 0 but less than 100, look for the following message in the logMonitor

```
FITS_LOG          /UNFORSEEN: Readout overflow
```

This normally means that during the startup of the FIERA controller, the S/W was not able to "lock down" sufficient memory to ensure that the whole image fits in physical memory. In the logMonitor in the startup messages for the process *fcdex* should be the message

```
fcdex Failed to lock exposure into memory
```

Check that the user running the FIERASW has root permissions.

#### 5.3.2 Failure to allocate the exposure memory

If the readout fails with the following message in the logMonitor

```
 fcd fcdrdt 52 62
 fcdREAD_EXP.C:210 301 9466 1 W fcdERR_GENERIC : Error allocating memory.
```

this normally means that the request for memory dynamic allocation "hits" the database in ram.

Check that the environment variable CCSDBSHM is set to a reasonable value (suggested: 0x20000000). This variable is set in the *environment\_loader* file.

#### 5.3.3 Failure to allocate shared memory segment

If the readout fails with a message in the logMonitor looking like the following:

```
 fcd      fcditWs_<CCDNAME>
 fcditWs_RTD.C:361 301 3424 1 W fcdERR_GENERIC: Cannot allocate shared segment .
```

this normally means that the shared memory setting is wrong.

Check that the system has enough physical memory, and/or that the shared memory configuration in the */etc/system* file is correct (see 2.1.1.4)

### 5.4 Rebooting/restarting the SLCU

Rebooting the SLCU can be done in a number of different ways depending upon how serious the failure is. The different ways are listed here in increasing order of severity.

The remote reboot techniques will only work if you are still able to log into the machine remotely, if this is not possible you will need physical access to the machine.



#### 5.4.1 Remote reboot using OLDB environment

This is the “ standard”way to restart the SLCU and can be used from INStrument S/W scripts.

From the INStrument workstation type the following

```
% fcdDcsSlcuReboot.sh $CCDNAME $RTAPENV $CCDLENV
```

This script used the restarting of the remote OLDB environment to check that the SLCU has rebooted OK.

#### 5.4.2 Remote reboot using only operating system

This technique should be used when remote access to the machine is still possible but communication with the OLDB environment cannot be established after reboot.

From the INStrument workstation type the following

```
% rlogin <SLCU Hostname> -l reboot
```

If after some time you can “ping” the machine, you can remotely log into the machine as *fcdrun* and try and determine why the OLDB environment is not starting properly (see 5.2.1.3)

#### 5.4.3 Remote halt followed by reset or power cycle

This should be used when there is a suspicion that some H/W component in the SLCU rack may be at fault, and you want to try and complete power cycle or reset or you need to power down the SLCU rack for some other reason.

From the INStrument workstation type the following.

```
% fcdDcsSlcuHalt.sh $CCDLENV
```

NOTE: After performing this you MUST perform either a reset on the SLCU front panel or a complete power cycle of the SLCU rack.

#### 5.4.4 Local halt followed by reset or power cycle

If no remote access to the machine is possible, you can connect an RS232 terminal to the front panel of the SLCU using a cable which is kept by the ODT, a dumb terminal should be connected to the cable marked “ttya”. If you can get a login prompt on this terminal you can perform the following

```
login: halt
ok
```

When the OK prompt is printed it is safe to reset or cycle power on the machine.

#### 5.4.5 SLCU power off

To power off the SLCU log as *fcdrun* and run the command

```
poweroff
```

### 5.4.6 Hard reset or power cycle

In the very last resort if no remote or local access to the machine is possible you can go to the machine and hit the reset button or cycle the power. This is not an operation to be undertaken lightly, there is the possibility of disk corruption leading to a completely broken system.

### 5.4.7 When the SLCU refuses to communicate over the network even after reboot

You can connect an RS232 terminal to the front panel of the SLCU using a cable which is kept by the ODT, the TTY should be connected to the cable marked "ttya". Then hit the reset button or cycle power.

The SLCU should output the normal boot messages indicating that it is booting from disk.

Some of the previously encountered booting problems are listed here:

#### 5.4.7.1 Dead disk / not responding disk

If instead of booting from the disk, the SLCU prints messages like

```
"Timeout waiting for ARP packet"
```

This means that it cannot access the Disk.

1. Check the power connector to the hard disk.
2. Check the SCSI cable connecting the hard disk with the SPARC.
3. Check the "paddle board" which provides the SCSI connector on the back of the VME rack.

If all else fails you will need to replace the disk with the spare.

#### 5.4.7.2 Corrupted disk

If you get a message like

```
"One or more filesystems corrupt, run fsck manually to continue"
```

You will need to run "fsck" on the file system, type the following:

```
% fsck -y /dev/rdisk/c0t3d0s0
```

#### 5.4.7.3 Dead SLCU

If the SLCU does not even attempt to access the disk, then the only course of action is to replace the complete processor unit.

## 5.5 Running FIERA sequence checker

To check the sequences defined for a camera you need to run the following program on the SLCU, so log into the SLCU (as the user *fcdrun*) and type the following:

```
fcdrun% fcdcheckseq
```

The output should resemble the following:

```
Checked sequence ALL_integrate_NON_MPP.
```

```
Checked sequence Tracker_test.
Checked sequence Tracker_test1.
Checked sequence Tracker_wipe.
Checked sequence small.
System configuration loaded.
    Sequences      : 5.
```

If you get some kind of error message, this implies that the FIERA configuration is inconsistent, the error message should indicate the file name and some description of the error.

## 5.6 Running detector head electronics diagnostics

There is a program supplied to perform a complete Detector Head Selftest. This program needs to be run locally on the SLCU, so you will need to log into the SLCU (as the user *fcdrun*) and set the `DISPLAY` variable to the appropriate device.

```
fcdrun% fcdtestseq
```

You should see an Xterm appear with the title "tis", you should also see the following kinds of output.

```
*****
FIERA DSP Software, Version 2.23 - no polling mode
*****

-> opening command link, will block if SLCU program is not running
-> waiting ...
-> command PING
-> command PING
-> command SETCONFIG
.
.
-> command INIT
-> command SELFTEST
-> command ONLINE
```

If the Xterminal remains empty, this implies that the basic communication with the DSP is failing see [5.2.1.4].

A list of some of the more common errors which could occur during SELFTEST is included below:

### 5.6.1 Cabling between DSP and VME interface board is incorrect (or broken)

```
fcdlComInit
ERROR: fcdlCom.c/243: fcdlComPoll_iiof3: timeout polling iiof3 register
ERROR: fcdlCom.c/305: fcdlComTstEclLoopback: error calling fcdlComPoll_iiof3
ERROR:
ERROR:      !!! CHECK THE CABLE CONNECTIONS WITH THE DSP BOARD !!!
ERROR:
```

### 5.6.2 Non existent board (or board dead)

```
fcclClkInit for CLKDRV1 board
ERROR: fcclMsq.c/754: fcclMsqLoadSram: mseq status register on board 0x50000 is
0xffff
ERROR: fcclMsq.c/1137: fcclMsqSetOut: error calling fcclMsqLoadSram
ERROR: fcclClk.c/969: fcclClkInit: error calling fcclMsqSetOut
ERROR: fcclDet.c/1102: fcclDetInit: failed to initialise board 0x50000
```

The identifier of the board is displayed.

### 5.6.3 Analogue bias board not reaching desired voltage

```
ERROR: fcclAnb.c/535: fcclAnbCheckVoltage: voltage of DAC 0 on ANABIAS0 should be
23.700001, but is 7.241650
ERROR: fcclAnb.c/770: fcclAnbLoadPriph: error calling fcclAnbCheckVoltage
ERROR: fcclAnb.c/535: fcclAnbCheckVoltage: voltage of DAC 1 on ANABIAS0 should be
15.300000, but is 7.241650
ERROR: fcclAnb.c/770: fcclAnbLoadPriph: error calling fcclAnbCheckVoltage
ERROR: fcclAnb.c/535: fcclAnbCheckVoltage: voltage of DAC 3 on ANABIAS0 should be
14.500000, but is 14.340405
ERROR: fcclAnb.c/770: fcclAnbLoadPriph: error calling fcclAnbCheckVoltage
ERROR: fcclAnb.c/971: fcclAnbSelftest: error calling fcclAnbLoadPriph
ERROR: fcclDet.c/1171: fcclDetSelftest: error calling fcclAnbSelftest
```

The messages should indicate the board and DAC which are at fault.

### 5.6.4 SIMM on clock driver board missing or dead

```
fcclClkSelftest for CLKDRV0 board
ERROR: fcclClk.c/749: fcclClkDacInit: SIMM 6, DAC 0, voltage is: 0x53f, should be:
0x4ed
ERROR: fcclClk.c/816: fcclClkLoadPriph error calling fcclClkDacInit
ERROR: fcclClk.c/546: vss voltage for SIMM 0 should be -8.000001 and is 3.465588
ERROR: fcclClk.c/579: fcclClkBilevelTest: vdd voltage for SIMM 0 should be
3.500000 and is 8.945554
ERROR: fcclClk.c/835: fcclClkLoadPriph error calling fcclClkBilevelTest
ERROR: fcclClk.c/1040: fcclClkSelftest: error calling fcclClkLoadPriph
ERROR: fcclDet.c/1197: fcclDetSelftest: failed on board 0x40000
```

If a SIMM is broken, you will get a lot of the above messages. The messages should indicate the board which is at fault.

### 5.6.5 Preamp disconnected or failed

```
ERROR: fcclVid.c/310: Ack Reception: timeout while waiting for ack
ERROR: fcclVid.c/414: fcclI2CpioWrite: error writing to pio
ERROR: fcclVid.c/593: fcclVidI2CSet: error calling fcclI2CpioWrite
ERROR: fcclVid.c/822: fcclVidSetPio: error calling fcclVidI2CSet for preamp
ERROR: fcclVid.c/1117: fcclVidLoadPriph: error calling fcclVidSetPio
```

```
ERROR: fcdlVid.c/1233: fcdlVidSelftest: error calling fcdlVidLoadPrIPH
ERROR: fcdlDet.c/1203: fcdlDetSelftest: failed on board 0x80000
```

The messages will indicate which video board is being tested.

## 5.7 PULPO trouble shooting

If there has been a problem initializing the PULPO controller or controlling the shutter, the error could be:

1. The cable between the SLCU and the PULPO unit
2. The PULPO unit itself
3. The shutter controller controlled by PULPO

The steps to go through to determine the source of the problem are:

### 5.7.1 Check the PULPO configuration

The configuration information which affect the communication with PULPO are

1. `$INS_ROOT/SYSTEM/COMMON/CONFIGFILES/$CCDNAME/pulpo.cfg`
2. `$INS_ROOT/SYSTEM/COMMON/CONFIGFILES/$CCDNAME/$CCDNAME.dbcfg`

#### 5.7.1.1 pulpo.cfg

This file defines the PULPO units available and how they are attached to the SLCU

```
#
# Pulpo configuration
#
# PULPO's present
#
# format of the line is
# Unit_Number Full_Device_Path
1 /dev/ttyb
```

In the file above it shows that there is a PULPO `Unit_Number 1` attached to physical device `/dev/ttyb`. If you are using one of the dedicated PULPO cables, then this is automatically `"ttyb"`, if you are using the split cable, one of the split ends is labeled `ttya`, the other `ttyb`.

#### 5.7.1.2 \$CCDNAME.dbcfg

This is the standard CCD configuration file. One section of which defines the " type"of shutter that the camera uses. See *fcdConfig* in [5]. In the configuration section " Shutter"you can select PULPO2, PULPO1 or Digital.

Unfortunately, the mapping goes from PULPO2 == `Unit_Number 1`, PULPO1 == `Unit_Number 0`. So in the example here we have selected `Unit_Number 1`, so the *fcdConfig* selection should be PULPO2.

## 5.7.2 Check basic communication with the PULPO unit

Log into the SLCU as the user *fcdrun* and type the following:

```
fcdrun % fcdstoppulpo
```

This should kill any instances of the PULPO server which is running. Then restart the PULPO server and maintenance panel using the following:

```
fcdrun % fcdstartpulpo
```

On the logMonitor display, you should see the following output indicating that the initial communication with the device is complete.

```
fcdpServer      PULPO unit 1 on TTY "/dev/ttyb" initialized by server.
fcdpServer      <Server> Downloading initial values.
fcdpServer      <Server> Downloading initial values complete.
```

If instead you see output like:

```
fcdpServer      cannot read from TTY, 3 retries
fcdpServer      failed to set PULPO into CTRL Mode
fcdpServer      ERROR : failed to set PULPO Unit 1 into CTRL Mode
fcdpServer      <Server> failed to create PULPO Interface.
```

This implies either the cabling is incorrect, or the PULPO unit has stopped communicating completely.

## 5.7.3 PULPO control

After checking that the basic communication is OK with PULPO you can check other PULPO operations.

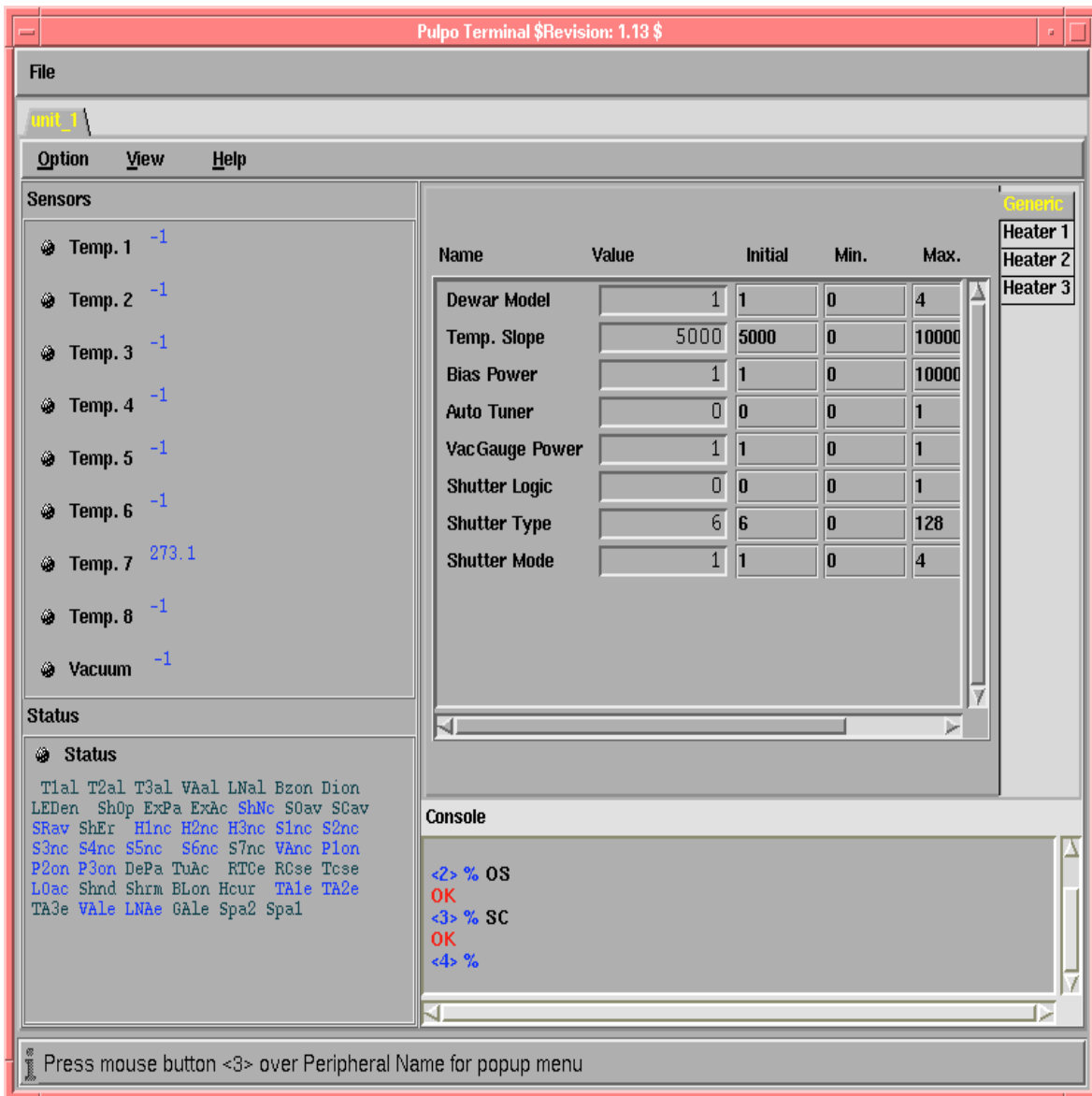
### 5.7.3.1 Basic shutter test

There is a simple test program provided to test basic shutter operation.

```
fcdrun% fcdpTest 1 4
-----
EXPOSURE TEST
-----
setup exposure: time 3.00, mode 1started exposure: time 3.00, mode 1, OD 0.00
Exposure done..CD 0
setup exposure: time 8.00, mode 1started exposure: time 8.00, mode 1, OD 1e-06
Testing pause/continue cycles
Pause Close delay 1e-06
Continue Open delay 1e-06
Pause Close delay 1e-06
Continue Open delay 1e-06
Pause Close delay 1e-06
Continue Open delay 1e-06
Pause Close delay 1e-06
Continue Open delay 1e-06
Waiting for exposure to complete
Exposure done..CD 0.00
```

setup exposure: time 6.00, mode 1 started exposure: time 6.00, mode 1, OD 1e-06  
Make exposure paused  
Abort exposure

### 5.7.3.2 Comprehensive PULPO test



Using the PULPO maintenance panel it is possible to interact directly with the PULPO controller. Log values from temperature sensors, directly open and close the shutter etc.

## 5.8 Problems with Image Display

### 5.8.1 Problems with Real-Time Image Display

If the following error occurs at the beginning of the image readout:

```
Failed in calling CCS routine rtdInitImageEvt.
```

the Real Time Display is not installed or the *rtdServer* is not running.

Try to start `rtdServer (%rtdServer &)`. If it fails (*rtd* not installed), just ignore the error: simply



no image display is possible with *rtd*. Images can still be saved in a FITS file.

### 5.8.2 Problems with shared memory allocation

If the following error occurs at the beginning of the image readout:

```
Cannot allocate shared segment
```

not enough memory has been allocated by the system for the image.

If this error occurs at SLCU level, check the contents of the `/etc/system` file, as described in 2.1.1.4

If this error occurs at Instrument workstation level, check in [7] and [8] how to properly configure the workstation, keeping in mind the “rule of thumb” described in 2.1.1.4 about the quantity of memory which should be allocated.



## 6 REFERENCE

This chapter provides a short description in terms of manual pages of the FIERA CCD Controller utilities.

### 6.1 Maintenance utilities

In this section the manual pages for the following utilities are presented:

1. Check the archive version of a DSP binary code (*fcdlWhat*).

### 6.1.1 fcdlWhat

#### NAME

fcdlWhat - show the version of object modules used to generate a C40 DSP file.

#### DESCRIPTION

fcdlWhat <filename1> <filename2> <filename3> ...

This utility reads the file(s) named <filename\*> and searches for occurrences of the string "@(#)". It prints the rest of the string following the "@(#)" marker.

<filename\*> IN name(s) of the file(s) to be checked

#### RETURN VALUES

SUCCESS if no error occurred  
FAILURE if file not opened

#### CAUTIONS

this tool works only with a binary COFF object file converted into an ascii LOD file, 32 bit wide.

#### EXAMPLE

```
fcdlWhat dspsci1.app dspsci2.app
```

- - - - -

Last change: 14/12/05-11:30



