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VERY LARGE TELESCOPE

FIERA CCD Controller

Software Maintenance Manual

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

TIM module usage: procedures to connect a TIM board to the FIERA SPARC and to test the connections.

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, 2.0 12/04/95 ---- VLT Instrumentation Sw Specification

[3] VLT-SPE-ESO-17240-0385, 2.1 15/07/96 ---- INS Common Software Specification

[4] GEN-SPE-ESO-19400-0794, 1.08 15/11/96 ---- ESO Data Interface Control Document

[5] VLT-SPE-ESO-13640-1388, 1.3 17/02/01 ---- 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
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 VLTSW 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 upgraded or not.

The case which requires the update 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.

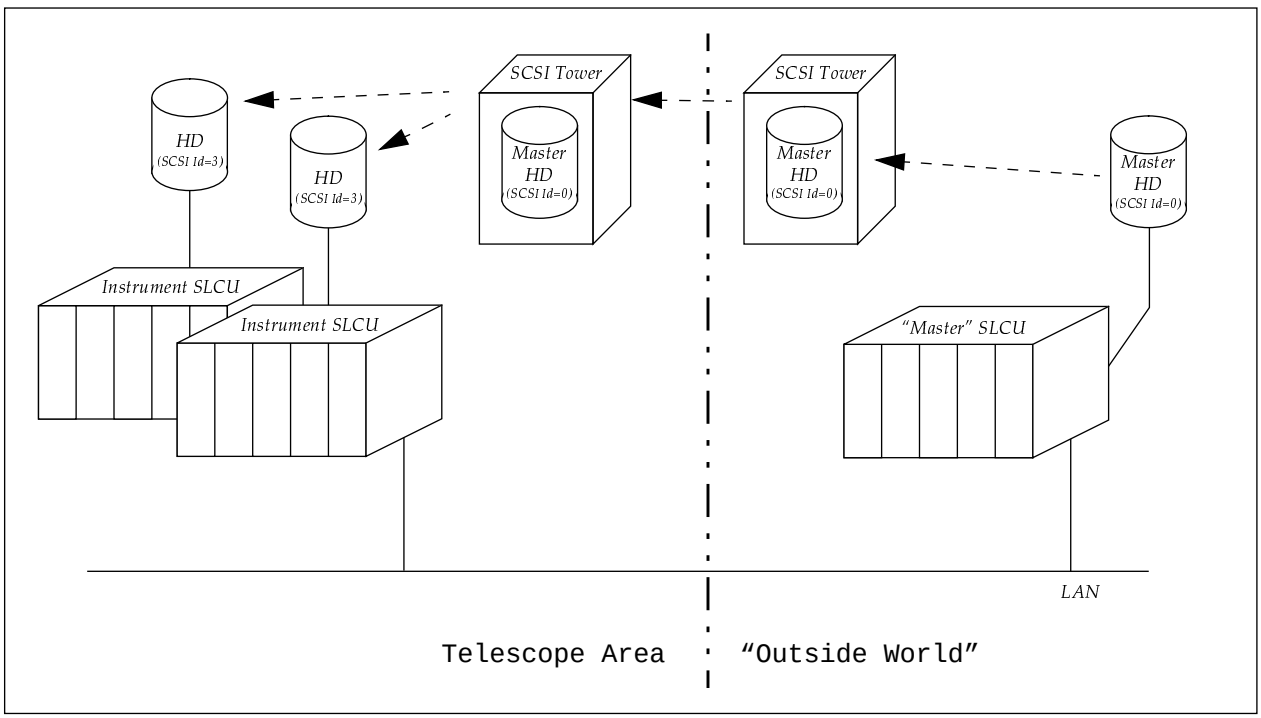
In the following paragraphs, the different procedures are described.

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 [a]	Tag [a]	Flag [a]	Filesystem [b]	Size (MB)
0	root	wm	/	160
1	usr	wm	/usr/openwin	300
2	backup	wu	overlap	[c]
3	var	wm	/var	250
4	swap	wu	swap	256 [d]
5	unassigned	wm	/opt	200
6	usr	wm	usr	300
7	home	wm	/export/home	<remaining space>

Tab. 1 - FIERA SLCU partition table

a. as shown by the "format" command
b. as shown at the "Automatically Layout File Systems" screen during the OS Installation Procedures described in [8]
c. don't change the size shown here !!!
d. as a rule, define here the double of the available system memory

   NOTE: select `/usr/openwin` when requested about which partitions must be created.
   - 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 SCLU, 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  wf1ccd.pl.eso.org  wf1ccd   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`" [1].

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

IMPORTANT: there are two types of DSP board (*LSI* and *Jens Benner* boards). Be sure to install the appropriate driver !!!

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=`

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

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

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

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

Edit the file `$PECS_ROOTDIR/releases/$PECS_RELEASE/etc/locality/misc-$HOST.env` modifying the definitions of `ACC_HOST`, `RTAPENV`, `CCDNAME` and `INS_ROOT` appropriately.

NOTE: in the `$PECS_ROOTDIR/releases/$PECS_RELEASE/etc/locality/misc-$HOST.env` file are set all the environment variables for the generation of the VLTSW in the "CCS-lite-WS" case.

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:0:1:0000-Halt user(0000):/:/usr/sbin/halt
      ```

```
reboot:x:0:1:0000-Reboot user(0000):/:/usr/sbin/reboot
```

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**[1] (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

1. This is valid for CCS_Lite on HP-UX 11

- Hardware needed:
  a. ASCII terminal.
  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 "Master hard 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[1].
8. Check that both the internal and the "Master" hard disks are recognized using "`probe-scsi`" at the `ok` prompt. If ok, then boot the Instrument SLCU from the "Master HD", 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 "Master" Hard 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
```

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

```
FORMAT MENU:
        disk       - select a disk
        .......
        quit

format> par

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

partition> pri

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

11. For each partition, dump the contents of the "Master" SLCU Hard Disk into the Instrument SLCU Hard Disk, repeating the following sequence of commands (replace `<i>` with 0, 1, 3, 5, 6, 7 - *skip 2 and 4* !):

```
# newfs /dev/rdsk/c0t3d0s<i>
# mount /dev/dsk/c0t3d0s<i> /mnt
# ufsdump 0f - /dev/rdsk/c0t0d0s<i> | (cd /mnt;ufsrestore xf -)
# fsck -y /dev/rdsk/c0t3d0s<i>
# 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-<mslcu>.env` \
`$PECS_ROOTDIR/releases/$PECS_RELEASE/etc/locality/apps-$HOST.env`
where <`mslcu`> is the name of the Master SCLU
22. mv \
`$PECS_ROOTDIR/releases/$PECS_RELEASE/etc/locality/misc-<mslcu>.env` \
`$PECS_ROOTDIR/releases/$PECS_RELEASE/etc/locality/misc-$HOST.env`
where <`mslcu`> 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`" run:

```
> 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 copyed (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 Intrument 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    /vlt/MAR2001/CCSLite/bin/ccsScheduler*
-rwsr-xr-x   root    /vlt/MAR2001/CCSLite/bin/msgServer1*
-rwsr-sr-x   vltmgr  /vlt/MAR2001/CCSLite/bin/wpQueryData*
-rwsr-sr-x   vltmgr  /vlt/MAR2001/CCSLite/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/dbl
> make clean db
```

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

2.4 CCD Camera Installation Verification

See the corresponding paragraph in [5].

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)**.

This section provides a description of the procedures for the backup of a FIERA SPARC Hard Disk on a spare Hard Disk unit.

3.1 Hardware requirements

In order to create an Instrument spare Hard Disk, containing the up-to-date backup of the FIERA SPARC Hard Disk, the following system is required (see Fig.2):

1. an "*Instrument FIERA SPARC*", whose Hard Disk has to be copied,
2. a "*Telescope Control Room (TCR) Workstation*", with no particular requirements about hardware or Operating System (it is needed just to log in remotely to the "*Instrument FIERA SPARC*"),
3. a SPARC "*Dump Workstation*" running Solaris 2.X, with a SCSI connection for a second Hard Disk and connected to:
4. a DAT tape device,
5. a DDS-2 (120 m/Native Capacity 4 GB) tape,
6. a Hard Disk of the same type of the FIERA SPARC Hard Disk to be backed up.

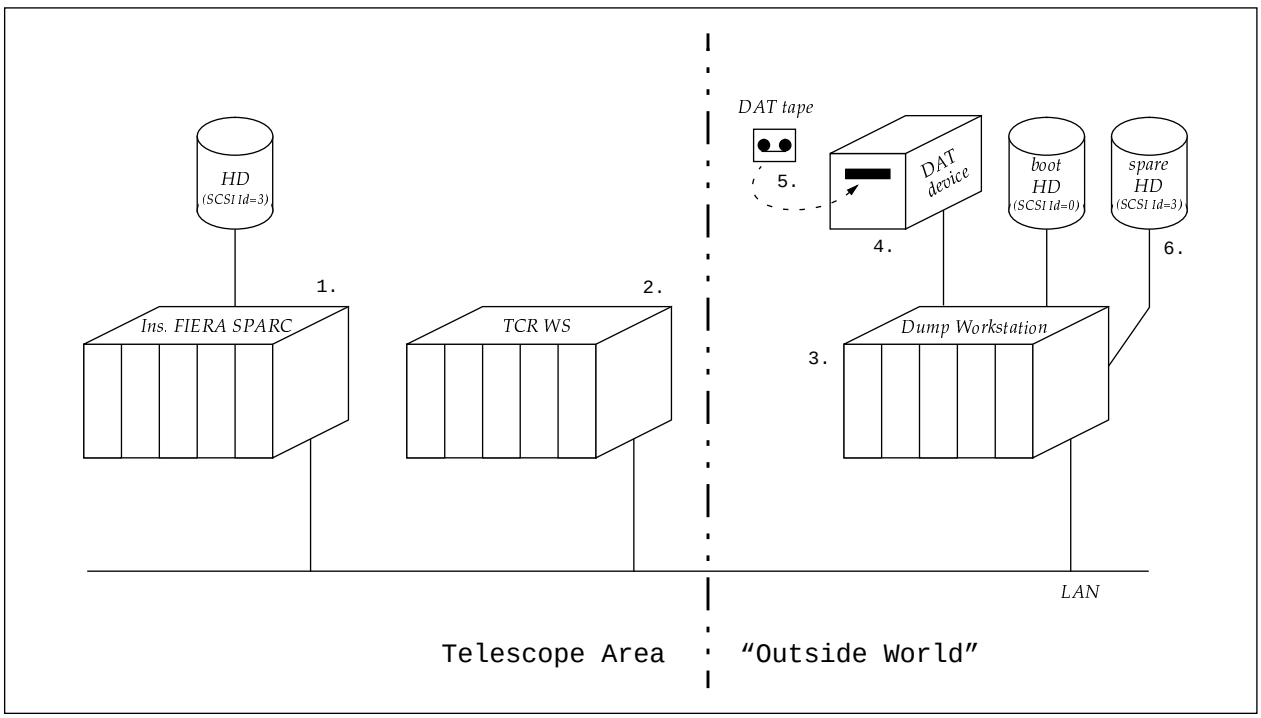


Fig.2 - Hardware Configuration

Since all the FIERA SPARC Hard Disks have their SCSI Id equal to `3`, **the boot Hard Disk of the "Dump Workstation" (3.) must have the SCSI Id equal to `0`**, in order to prepare the spare Hard Disk as a perfect copy of the Instrument FIERA Hard Disk[1].

3.2 System requirements

In order to create an Instrument spare Hard Disk, containing the up-to-date backup of the FIERA SPARC Hard Disk, the following system configuration is required:

- The "*Dump Workstation*" connected to the DAT device (3. in par. 3.1) must be **reachable**[2] from the "*Instrument FIERA SPARC*" (1. in par. 3.1).
- The Hard Disk backup procedure consists of remote dump/restore performed from the "*Instrument FIERA SPARC*" on the "*Dump Workstation*". Therefore the **user** which performs the remote dump/restore operations
  a. must be **known**[3] by the "*Dump Workstation*",
  b. must be **allowed to access**[4] the "*Dump Workstation*" remotely.

  The "`fcdrun`" user is common to all the FIERA SPARCs: therefore **the dump/restore operations should be performed as `fcdrun`**.

A standard configuration could therefore be:

- the "*Instrument FIERA SPARC*" (1.) is mounted on the Telescope,
- the "*TCR Workstation*" (2.) is in the Telescope Control Room,
- the "*Dump Workstation*" (3.) resides in the Detector Laboratory in the Telescope Control Building.

3.3 Backup Operations

In the next examples the following setting is used:

"*Instrument FIERA SPARC*" hostname : `insFiera`
"*Dump Workstation*" hostname : `dumpFiera`

3.3.1 Prepare the backup Hard Disk

If the backup Hard Disk is new, it has to be partitioned.
Use the `format` UNIX command to perform this operation (see the command manpage calling `man -s 1m format`).
See the *fcdDump* manpage (see 7.1.1) for a description of the Hard Disk partition table.

1. The SCSI Id of an Hard Disk is set by the jumpers on the back of the Hard Disk. These jumpers define the Id with a binary code.
2. network operations must be allowed from the "*Instrument FIERA SPARC*" to the "*Dump Workstation*" (check the network connection and permissions, in particular firewall protections)
3. the user must be able to login on the "*Dump Workstation*" (set the `/etc/passwd` file on this host appropriately)
4. the user must be able to perform remote shell operations (set the user file `~/.rhosts` on the "*Dump Workstation*" appropriately)

3.3.2 Dump the Instrument FIERA Hard Disk on a DAT tape

On the "*Dump Workstation*":

1. Insert a DDS-2 (120 m/Native Capacity 4 GB) tape in the DAT drive

On the "*TCR Workstation*":

2. remote log in the "*Instrument FIERA SPARC*"
   ```
   > rlogin insFiera -l fcdrun
   ```
3. dump the Hard Disk
   ```
   > fcdDump -dump dumpFiera
   ```
   This operation will take around 1-1.5 hour. At the end the DAT tape will contain the contents of the "*Instrument FIERA SPARC*" Hard Disk.

3.3.3 Dump the DAT tape contents on the spare Hard Disk

On the "*Dump Workstation*":

1. login as `fcdrun`
2. halt the host
3. connect the spare Hard Disk to the SCSI bus, checking before that its SCSI ID is set to `3`
4. reboot the host
   ```
   > boot -r
   ```

Once the "*Dump Workstation*" has rebooted:

5. log in the "*Dump Workstation*" as `fcdrun`
6. dump the Hard Disk
   ```
   > fcdDump -restore
   ```
   This operation will take around 2-2.5 hours. At the end the spare Hard Disk will contain the contents of the DAT tape.

Once the restore operations have been completed, on the "*Dump Workstation*":

7. Remove the DDS-2 tape from the DAT drive, label and archive it
8. login as `fcdrun`
9. halt the host
10. disconnect the spare Hard Disk from the SCSI bus
11. if needed, connect a new spare Hard Disk
12. reboot the host
    ```
    > boot -r
    ```

4 PREPARING THE SPARE CPU SPARC TO REPLACEMENT

The SPARC CPU board of the "*Dump Workstation*" decribed in Chapter 3 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 "boot monitor" 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 USAGE OF A TIM BOARD

5.1 Connecting a TIM board to the FIERA SPARC

To use TIM module board on the FIERA SPARC, the TIM module has to be connected to the FIERA DSP Board via the P2 VME connections.

5.2 Testing the connections with the TIM board

The connections with the TIM module board can be tested using the *fcdTimTest.sh* utility (see 7.1.3). This utility has to be run by the `fcdrun` user (to have the correct TIM access rights).

6 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.

6.1 Problems during installation

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

6.1.1 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

6.2 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.

6.2.1 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:

6.2.1.1 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
```

6.2.1.2 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 6.4.

6.2.1.3 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 6.4).

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.

6.2.1.4 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 [6.4]). 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 [6.6] for a description of standalone electronics diagnostics.

6.2.1.5 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-
quence 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 [6.5]).

6.2.2 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:

6.2.2.1 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 [6.6].

6.2.2.2 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 [6.6] for instructions on running Detector Head Electronics diagnostics.

6.2.2.3 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 [6.7] for a description of PULPO troubleshooting.

6.3 Software starts but exposure status goes to FAIL

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

6.3.1 Failure with the Data Capture Board

If the "`readout.percent`" database attribute stays at `0`, then the pixels from the detector head electronics are being lost somewhere. Check the Data Capture cable between the DSP board and the SPARC, if this appears OK, then the problem lies either with the DSP board or with the Data Capture Board on the SPARC itself.

6.3.2 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 *fcdexp* should be the message

```
fcdexp Failed to lock exposure into memory
```

The solution to this problem is to reboot the SLCU and check the startup messages to ensure that this message does not recur.

6.4 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.

6.4.1 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.

6.4.2 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 6.2.1.3)

6.4.3 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.

6.4.4 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.

6.4.5 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.

6.4.6 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:

6.4.6.1 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 connecter on the back of the VME rack.

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

6.4.6.2 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 each of the file partitions which is corrupt, type the following:

```
% fsck -y /dev/rdsk/c0t3d0s0
% fsck -y /dev/rdsk/c0t3d0s3
% fsck -y /dev/rdsk/c0t3d0s5
% fsck -y /dev/rdsk/c0t3d0s6
% fsck -y /dev/rdsk/c0t3d0s7
```

6.4.6.3 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.

6.5 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.

6.6 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 [6.2.1.4].

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

6.6.1 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:
```

6.6.2 Non existent board (or board dead)

```
fcdlClkInit for CLKDRV1 board
ERROR: fcdlMsq.c/754: fcdlMsqLoadSram: mseq status register on board 0x50000 is
0xffff
ERROR: fcdlMsq.c/1137: fcdlMsqSetOut: error calling fcdlMsqLoadSram
ERROR: fcdlClk.c/969: fcdlClkInit: error calling fcdlMsqSetOut
ERROR: fcdlDet.c/1102: fcdlDetInit: failed to initialise board 0x50000
```

The identifier of the board is displayed.

6.6.3 Analogue bias board not reaching desired voltage

```
ERROR: fcdlAnb.c/535: fcdlAnbCheckVoltage: voltage of DAC 0 on ANABIAS0 should be
23.700001, but is 7.241650
ERROR: fcdlAnb.c/770: fcdlAnbLoadPriph: error calling fcdlAnbCheckVoltage
ERROR: fcdlAnb.c/535: fcdlAnbCheckVoltage: voltage of DAC 1 on ANABIAS0 should be
15.300000, but is 7.241650
ERROR: fcdlAnb.c/770: fcdlAnbLoadPriph: error calling fcdlAnbCheckVoltage
ERROR: fcdlAnb.c/535: fcdlAnbCheckVoltage: voltage of DAC 3 on ANABIAS0 should be
14.500000, but is 14.340405
ERROR: fcdlAnb.c/770: fcdlAnbLoadPriph: error calling fcdlAnbCheckVoltage
ERROR: fcdlAnb.c/971: fcdlAnbSelftest: error calling fcdlAnbLoadPriph
ERROR: fcdlDet.c/1171: fcdlDetSelftest: error calling fcdlAnbSelftest
```

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

6.6.4 SIMM on clock driver board missing or dead

```
fcdlClkSelftest for CLKDRV0 board
ERROR: fcdlClk.c/749: fcdlClkDacInit: SIMM 6, DAC 0, voltage is: 0x53f, should be:
0x4ed
ERROR: fcdlClk.c/816: fcdlClkLoadPriph error calling fcdlClkDacInit
ERROR: fcdlClk.c/546: vss voltage for SIMM 0 should be -8.000001 and is 3.465588
ERROR: fcdlClk.c/579: fcdlClkBilevelTest: vdd voltage for SIMM 0 should be
3.500000 and is 8.945554
ERROR: fcdlClk.c/835: fcdlClkLoadPriph error calling fcdlClkBilevelTest
ERROR: fcdlClk.c/1040: fcdlClkSelftest: error calling fcdlClkLoadPriph
ERROR: fcdlDet.c/1197: fcdlDetSelftest: 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.

6.6.5 Preamp disconnected or failed

```
ERROR: fcdlVid.c/310: Ack Reception: timeout while waiting for ack
ERROR: fcdlVid.c/414: fcdlI2CpioWrite: error writing to pio
ERROR: fcdlVid.c/593: fcdlVidI2CSet: error calling fcdlI2CpioWrite
ERROR: fcdlVid.c/822: fcdlVidSetPio: error calling fcdlVidI2CSet for preamp
ERROR: fcdlVid.c/1117: fcdlVidLoadPriph: error calling fcdlVidSetPio
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.

6.7 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:

6.7.1 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`

6.7.1.1 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`.

6.7.1.2 $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`.

6.7.2 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.

6.7.3 PULPO control

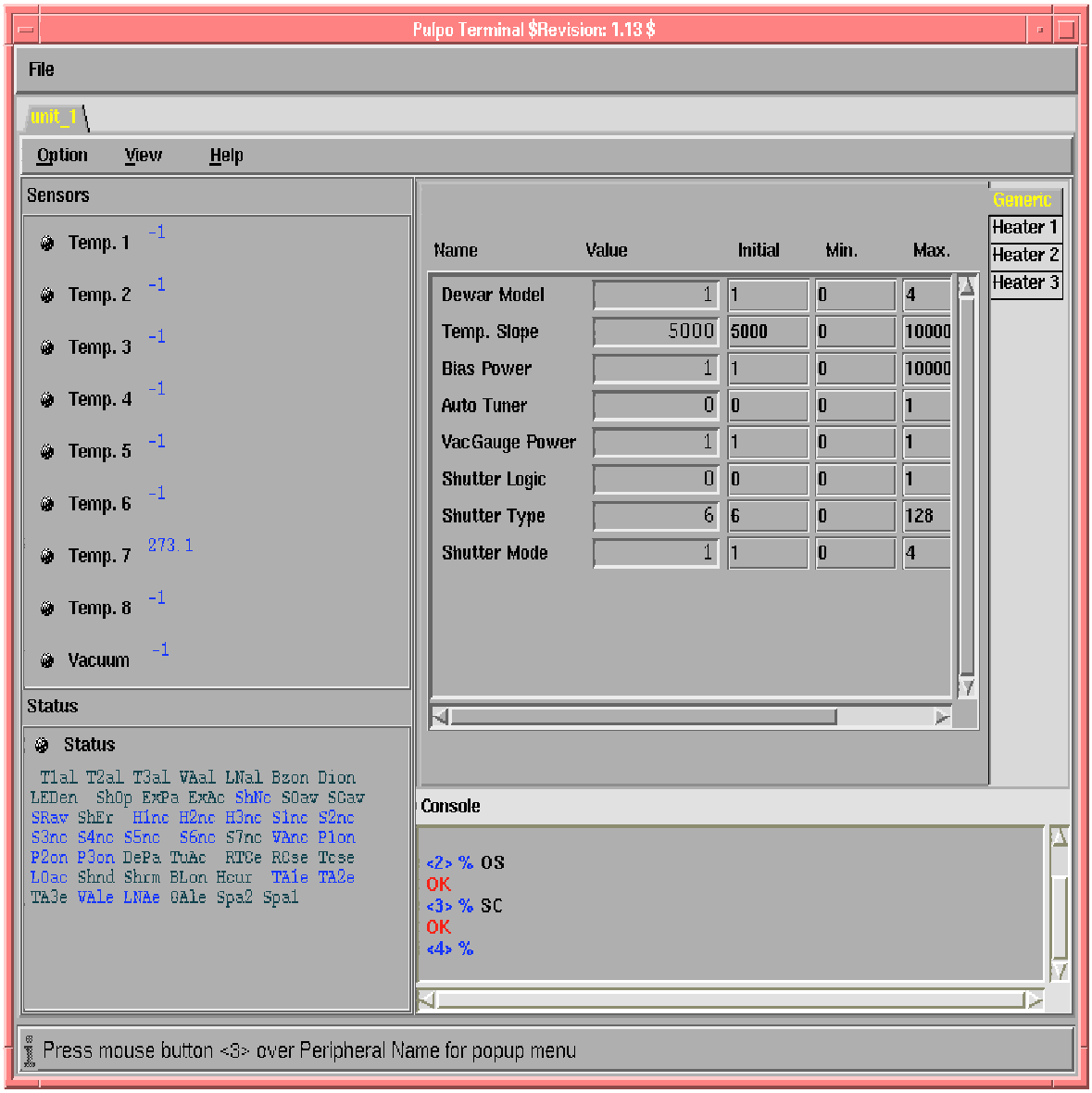
After checking that the basic communication is OK with PULPO you can check other PULPO operations.

6.7.3.1 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 1started exposure: time 6.00, mode 1, OD 1e-06
Make exposure paused
Abort exposure
```

6.7.3.2 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.

6.8 Problems with Real-Time Image Display

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

```
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.

7 REFERENCE

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

7.1 Maintenance utilities

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

1. Backup the Instrument FIERA SPARC Hard Disk (*fcdDump*).
2. Check the archive version of a DSP binary code (*fcdlWhat*).
3. Check the connections with a TIM Board (*fcdTimTest.sh*).

7.1.1 fcdDump

NAME

```
fcdDump - dump or restore a FIERA disk
```

SYNOPSIS

```
fcdDump -dump remote_host
fcdDump -restore [remote_host]
```

DESCRIPTION

```
This shell script allows a user to dump/restore a whole disk of a
Sparc running FIERA (SLCU). It is assumed that the scsi id of the disk
to dump/restore is 3. The script must be run as root and on a Sparc
running Solaris 2.x.
The parameter remote_host refers to host to which the tape device
is physically connected. This host may be either a Sun or an Hp
workstation. In case of a dump operation, remote_host must be specified.
In the case of a restore operation this parameter is optional and, if
not specified, defaults to the  local host.
As the disks of SLCUs are usually of 4 Gb size, it is foreseen for the
dump operation the usage of a DDS2 (120m, 4 Gb native capacity)
cassette. It is strongly advised to use a DDS2 device to dump the disk.
Remote dump/restore operation are performed as FCDDUMPUSER. So access
to the remote host as FCDDUMPUSER must be allowed. No restriction is
enforced on the choice of FCDDUMPUSER as long as this user has access to
the tape device. The environment variable FCDDUMPUSER must be set by the
user before running the script. If it is not set, the script will use
a default: "fcdrun".
The correspondence among devices and file systems is defined as follows:

/dev/rdsk/c0t3d0s0      /
/dev/rdsk/c0t3d0s6      /usr
/dev/rdsk/c0t3d0s4      /var
/dev/rdsk/c0t3d0s7      /export/home
/dev/rdsk/c0t3d0s5      /opt
/dev/rdsk/c0t3d0s3      /usr/openwin

These are the file systems which will be dumped/restored. These are
also the only file systems needed in order to have an exact replica of
the original system.
Disks on which the tape are restored are formatted so that all data
previously contained are lost. The disks must be partitioned beforehand.
Hereafter are included the partition tables of the two models of disks
currently used by FIERA systems.

Seagate ST34371N-0484

Total disk cylinders available: 5147 + 2 (reserved cylinders)

Part      Tag    Flag     Cylinders        Size       Blocks
  0       root    wm       0 -  175      141.80MB    (176/0/0)
  1       swap    wu     176 -  498      260.23MB    (323/0/0)
  2     backup    wu       0 - 5146        4.05GB    (5147/0/0)
  3        usr    wm     499 -  656      127.29MB    (158/0/0)
  4        var    wm     657 -  794      111.18MB    (138/0/0)
  5 unassigned    wm     795 - 1030      190.14MB    (236/0/0)
  6        usr    wm    1031 - 1515      390.75MB    (485/0/0)
  7       home    wm    1516 - 5115        2.83GB    (3600/0/0)
```

```
Seagate ST34520N-1444

Total disk cylinders available: 9004 + 2 (reserved cylinders)

Part      Tag    Flag     Cylinders        Size       Blocks
  0       root    wm       0 -  295      142.22MB    (296/0/0)
  1       swap    wu     296 -  833      258.49MB    (538/0/0)
  2     backup    wu       0 - 9003        4.22GB    (9004/0/0)
  3        usr    wm     834 - 1104      130.21MB    (271/0/0)
  4        var    wm    1105 - 1354      120.12MB    (250/0/0)
  5 unassigned    wm    1355 - 1750      190.27MB    (396/0/0)
  6        usr    wm    1751 - 2583      400.23MB    (833/0/0)
  7       home    wm    2584 - 9003        3.01GB    (6420/0/0)

In case it should be necesary to partion a disk of another type, this
operation should be done taking into account the following:
1. Total disk size must be equal or greater than 4 Gb.
1. Partions number, name and flags must be the same as in the previous
   table.
2. Partions size must be equal or greater. If disk size does not allow
   it, swap could be decreased.

Instruction on how to partition a disk may be found in Solaris 2.x
documentation e.g. in the man pages relative to format(1M). Refer to
FIERA maintenance manual for details on how to partition a disk.
The environment variable FCDDUMPTAPE and FCDRESTORETAPE may be used to
specify the device on which to perform backups. A no-rewind device must
be specified for dump and a rewind device for restore.
If not defined the devices are:
on HPs:
/dev/rmt/0lbn for dump
/dev/rmt/0lb  for restore
on Suns:
/dev/rmt/0mnb for dump
/dev/rmt/0mb  for restore
```

ENVIRONMENT

```
FCDDUMPUSER username used for remote tape operations; if not defined it
is set by default to "fcdrun"
FCDDUMPTAPE variable used to override default dump tape
FCDRESTORETAPE variable used to override default restore tape
```

RETURN VALUES

```
0 if success
1 if an error occurred
```

CAUTIONS

```
Scsi id of the disk dump/restored is assumed to be 3
The script must be run as root on a Sparc running Solaris 2.x
```

```
- - - - - -
Last change:  04/03/99-13:44
```

7.1.2 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 occured
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:  30/11/98-11:53
```

7.1.3 fcdTimTest.sh

NAME

fcdTimTest.sh - Test FIERA TIM/DSP Board Connections

SYNOPSIS

fcdTimTest.sh

DESCRIPTION

Utility to check the connection between the TIM and the DSP board on the FIERA SLCU.
The script checks the version of the existing DSP Interface Board (LSI or Jens Benner), running the appropriate DSP code accordingly.

FILES

fcdtimTest	SLCU program
fcdTim.app	DSP program (LSI version)
fcdTimb.app	DSP program (JBE version)
tis	DSP server

CAUTIONS

This script has to be run by the "fcdrun" user (to have the correct TIM access rights)

EXAMPLES

Run the utility

```
> fcdTimTest.sh
```

SEE ALSO

fcdtimTest.c	SPARC program
fcdTim.c	DSP program

- - - - - -

Last change: 02/03/99-13:12

__oOo__