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HEMT software

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Change Record

REVISION	DATE	AUTHOR	SECTION/PAGE AFFECTED	REMARKS
0	2010-08-18	Blanchet		Initial release
1	2013-06-13	Blanchet	Many	Update for debian 7.0

Content

1 Introduction

In 2010, IRAM has installed a new prototype receiver called HEMT at the IRAM 30M telescope. This document is the documentation reference for the HEMT software: installation, technical documentation, daily usage and troubleshooting.

2 Main features

- The software is written in C++/Qt.
- Two specific graphical interfaces for laboratory and observing.
- Automatic lo tuning.
- Built-in Simulator.
- XML RPC server for easy integration with observing software.
- Embedded SQL database to store configuration.

3 Installation

3.1 Requirements

Hardware
The minimal requirements for hardware are:

- CPU: x86 CPU at 500 MHz
- RAM: 512 MB
- CAN controller: TPMC816 PMC card from Tews Technologies GmbH

For software development, the CAN controller is optional, because the software provides a CAN simulator.

Operating system
The software targets Linux Debian 5.0, 6.0 or 7.0 amd64 as main platformw, but it should run on any computer with a recent Linux version.

Mandatory libraries

The following libraries are required to build the software

Name	Description	Version	Download
g++	GNU C++ compiler	>= 4.1	http://gcc.gnu.org
subversion	Subversion is an open source version control system.	>= 1.5	http://subversion.tigris.org
Qt	C++ Cross-platform application framework	>= 4.4.3	http://www.qtsoftware.com
Sqlite	Embedded SQL database	>= 3.3.6	http://sqlite.org
Xmlrpc-c	XML-RPC for C and C++.	>= 1.06	http://xmlrpc-c.sourceforge.net

All these libraries are very common, and you should find easily ready-to-install packages for your favorite Linux distribution.

Recommended software

The following programs are strongly recommended to modify easily the code.

Name	Description	Version	Download

Eclipse/CDT	C and C++ Integrated Development Environment (IDE) for the Eclipse platform.	>= 3.5	http://eclipse.org/cdt
doxygen	Automatic documentation system	>= 1.5.6	http://doxygen.org

All these software are very common, and you should find easily ready-to-install packages for your favorite Linux distribution.

3.2 Installation instructions for requirements

This procedure explains how to install the HEMT receiver software requirements on a fresh Debian 5.0 (Lenny) installation.

Install Linux Debian 7.0 amd64 on a computer.

Install development tools and libraries

```
# aptitude install rsync gcc g++ doxygen make gnuplot
# aptitude install manpages-dev graphviz sqlite3
# aptitude install libqt4-dev qt4-doc-html libqt4-sql-sqlite \
 libxmlrpc-c3-dev qt4-qtconfig libcurl4-openssl-dev subversion
```

Note: the Linux headers are required to build the CAN driver:

```
# aptitude install linux-headers-`uname -r`
```

Install useful packages:

```
# aptitude install openssh-server nmap xxdiff sqlite3-doc
```

Create the oper account

```
$ su -c "adduser oper"
```

3.3 Build HEMT software

Extract code from the repository

```
$ mkdir ~/develSVN
$ cd ~/develSVN
$ svn co svn://svn.iram.fr/30M/hemt/trunk hemt
```

Then use the Makefile to extract automatically the dependencies

```
$ cd hemt
$ qmake
$ make get_deps
```

Build the driver for the TPMC816 CAN board (not required if you use only the simulation)

```
$ cd ~/develSVN/tdrv011
$ su
# make install
```

Create a group which is allowed to access `/dev/tdrv011_*` devices

```
# groupadd can
# echo 'KERNEL=="tdrv011_[0-9]*", MODE="0664", GROUP="can"' > \
/etc/udev/rules.d/99-CAN.rules
```

On debian 7.0, the driver is loaded automatically, so there is nothing special to do.

Build the hemt code

Note: If you do not use Debian, you have to modify firstly the file `Utils/conf/conf.pri` to specify the libraries locations

```
$ cd ~/develSVN/hemt
$ ./build.sh
```

Optionally, you can build the API documentation. The documentation will be created in the `doxydoc` subdirectory.

```
$ make doc
```

Install the CAN tools

```
$ su
# cd ./CanIp/
# ./install.sh programs
# exit
```

Then, install the software **and the default data** in `/home/introot/hemt`
Note: the shared libraries are installed in `/home/introot/lib`

```
# cd /hemt
#./install.sh all
```

Warning:
To update only the software **without reinstalling the default settings**, use

```
# make -f Makefile.install programs
```

Nevertheless it is safer to backup `/home/introot/hemt` first, so you can restore the original installation in case of errors.

```
# tar cvfz ~/hemt-backup-`date --iso`.tar.gz /home/introot/{hemt,lib}
```

3.4 Configure environment

You should add `/home/introot/hemt/bin` to your path

To decode CAN identifier into symbolic names in CanLogger, you should also define CAN_DB_FILE as follow

```
export DEVICE_NAME=hemt
export CAN_DB_FILE=${INTROOT}/data/${DEVICE_NAME}.db
```

3.5 Initial test

For this initial test, we run
1.The CanManagers to enable the Can/IP protocol
2.The simulator
3.The autotuning lo program

First we remove the `/dev/tdrv011_*` devices, so the CanManager will run in simulation mode

```
$ su –c "rm –f /dev/tdrv011_*"
$ hemt-init-can.sh
$ xterm -e hemt-simul &
```

(click on LO button to activate the LO simulation)

Now run the LO autotuning program:

```
$ hemt-lo -f=70.0
```

3.6 Start application automatically

Add `/home/introot/hemt/bin/hemt-init-receiver.sh` to `/etc/rc.local` to initialize the software at the startup.

4 Internal programs

This section describes internal programs that drive the receiver. These programs are executed automatically, therefore normal users are not expected run them.

4.1 CanManager

For a complete description see the document *can-ip.pdf*

```
$ CanManager -h
CanManager is a bridge between the CAN bus and the CAN/IP protocol
Usage: CanManager [options]
Options:
  -d=/dev/devname     CAN controller device name to use. If missing,
                        the application runs in simulation mode
  -p=udpPort          Listen to UDP port udpPort
  -t1=delay1_us       Delay in microseconds between two CAN 1.0 messages.
                          Default=0
  -t2=delay2_us       Delay in microseconds between two CAN 2.0 messages.
                          Default=0

  -v             Display version information
  -h, -?         Display help

Example:
        CanManager -d=/dev/tdrv011_0 -p=2500 -l=20
```

For the HEMT software, CanManager must listen on port udp/2501

```
CanManager –d=/dev/tdrv011_1 –p=2501 –t1=100000
```

4.2 HEMT Server

HEMT server is an XML-RPC server to remotely control the receiver.

What is XML RPC ?
XML-RPC is a remote procedure call protocol that uses XML to encode its calls and HTTP as a transport mechanism. For a detailed introduction to XML RPC see http://en.wikipedia.org/wiki/XML-RPC

This protocol is very simple to use, and can be used from any programming language (many opensource libraries are available)

HEMT-server listens for XML-RPC calls on http://localhost:1080/RPC2

Note: The path */RPC2* is the default path for a XML-RPC server. Therefore, it can be sometimes omitted (it depends on the implementation library)

This server supports:
•introspection http://xmlrpc-c.sourceforge.net/introspection.html
•multicalls

4.2.1 Syntax

```
$ hemt-server -h
HEMT Server - XML-RPC Server
Listen on port 1080
Usage: hemt-server [options]
Options:
  -v        Display version information
  -h, -?    Display help
```

4.2.2 API Description

Since the XML-RPC server support introspection, we can retrieve the API with a simple program

```
$ ./ListMethods.py
ampli.setProtection
receiver.getCalibration
receiver.getPositionList
receiver.getStatus
receiver.setAttenuator
receiver.setCalibration
receiver.setLoSwitch
receiver.tuneLo
system.listMethods
system.methodHelp
system.methodSignature
system.multicall
system.shutdown
```

```
$ ./Introspection.py
# Connect to http://localhost:1080
------------------------------------------------------------------------
Name       : ampli.setProtection( string, int )
Return Type: int
Description: Set amplifier protection.
Return code is always zero.
Syntax:  ampli.setProtection( string ampliName, int protection)
  - valid ampli names are: all, ampli_H1, ampli_H2, ampli_V1, ampli_V2
  - protection: 0 => Off, 1 => On


------------------------------------------------------------------------
Name       : receiver.getCalibration(  )
Return Type: string
Description: Get current calibration position
Return string: moving, off, sky, hot, cold
Syntax:  GetCalibration( )

------------------------------------------------------------------------
Name       : receiver.getPositionList(  )
Return Type: array
Description: Get position list for receiver.SetCalibration()
Return Array of string.
Syntax:  GetPositionList( )

------------------------------------------------------------------------
Name       : receiver.getStatus(  )
Return Type: struct
Description: Returns the receiver status

------------------------------------------------------------------------
```

```
Name       : receiver.setAttenuator( string, int )
Return Type: int
Description: Set attenuator. Return code is always zero.
Syntax:  SetAttenuator( string attenuatorName, int attenuationDecibel)
- 'attenuatorName' in { 'H', 'V' }
- 'attenuationDecibel' must be in range [ 0, 31.5 ]


------------------------------------------------------------------------
Name       : receiver.setCalibration( string )
Return Type: int
Description: Set Calibration.
Return code:    - 0 : OK
    - 1 : Error
Syntax:  SetCalibration( string positionName )

Valid position names are:
off, sky, hot, cold

------------------------------------------------------------------------
Name       : receiver.setLoSwitch( string, int )
Return Type: int
Description: Set a LO switch.
Return code is always zero.
Syntax: setLoSwitch( string switchName, int switchValue)
 - switchName must be in: { gunn, deltaf, loop, sweep }
 - switchValue must be 0 or 1

------------------------------------------------------------------------
Name       : receiver.tuneLo( double, string )
Return Type: int
Description: Tune LO.
Return code:    - 0 : OK
    - 1 : Error
Syntax:  tuneLo( double loFreq, string deltaF )
    - loFreq: frequency in GHz
    - deltaF: '-' or '+'


------------------------------------------------------------------------
Name       : system.listMethods(  )
Return Type: array
Description: Return an array of all available XML-RPC methods on this server.

------------------------------------------------------------------------
Name       : system.methodHelp( string )
Return Type: string
Description: Given the name of a method, return a help string.

------------------------------------------------------------------------
Name       : system.methodSignature( string )
Return Type: array
Description: Given the name of a method, return an array of legal signatures.
Each signature is an array of strings.  The first item of each signature is
the return type, and any others items are parameter types.

------------------------------------------------------------------------
Name       : system.multicall( array )
Return Type: array
Description: Process an array of calls, and return an array of results.  Calls
should be structs of the form {'methodName': string, 'params': array}. Each
result will either be a single-item array containg the result value, or a
```

```
struct of the form {'faultCode': int, 'faultString': string}.  This is useful
when you need to make lots of small calls without lots of round trips.

----------------------------------------------------------------------
Name       : system.shutdown( string )
Return Type: int
Description: Shut down the server.  Return code is always zero.

----------------------------------------------------------------------
```

4.3 XML RPC client examples

4.3.1 Minimal python example

XML RPC is very easy and pleasant to use in python.

For example to call method `receiver.setCalibration` on the server, you need only the following lines.

```
import xmlrpclib
server = xmlrpclib.ServerProxy("http://localhost:1080" )
print server.receiver.setCalibration( "sky" )
```

4.3.2 Python examples

See directory `python/xmlrpc` for other XML-RPC python examples.

4.3.3 C++ client example

`hemt-cpp-GetStatus` is a small example for XML-RPC, written in C++.
The source code is available in `apps/GetStatus`

4.4 hemt-init-ampli

This program initializes the HEMT amplifiers.
It writes also a magic value in the amplifier volatile memory (ByteMemory=0xb6), to detect if the amplifiers are initialized or not.

4.4.1 Syntax

```
$ hemt-init-ampli -h
HEMT Init Ampli - Init Ampli
Usage: hemt-init-ampli [options]
Options:
  -v              Display version information
  -h, -?          Display help
```

4.5 hemt-check-ampli

This program checks that the amplifiers are initialized.

4.5.1 Syntax

```
$ hemt-check-ampli -h
HEMT Check Ampli - Check Ampli Status
Usage: hemt-check-ampli [options]
Options:
  -v              Display version information
  -h, -?          Display help
```

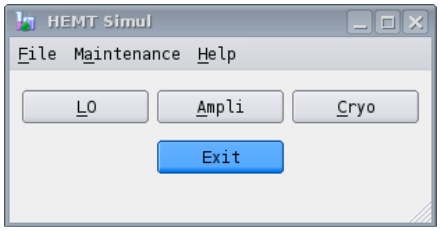
4.6 Simulator

The goal of this program is to simulate the HEMT receiver, so that the other software can be written before the receiver hardware is ready.

Syntax:

hemt-simul

4.6.1 Main window



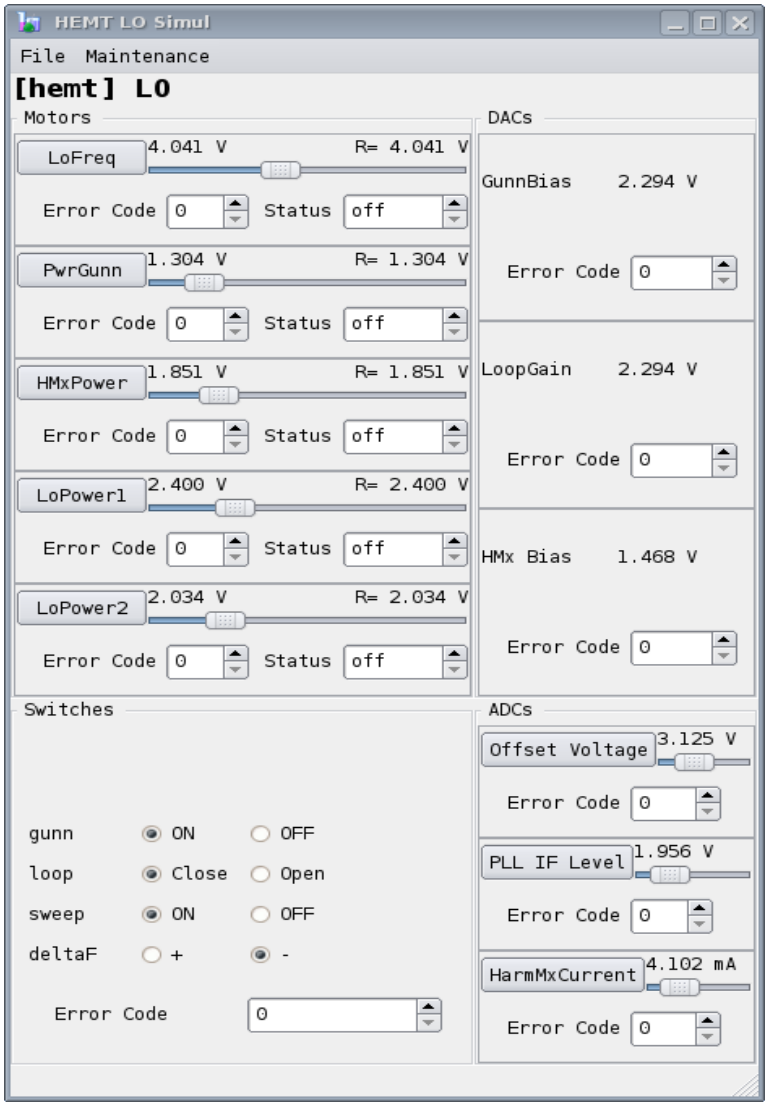
The main window has three buttons, click on them to display/hide simulation window for LO, Mixer or Cryo.

The simulation occurs only when the associated subwindow is opened.

For example, if you want to simulate only the LO, open only the LO window.

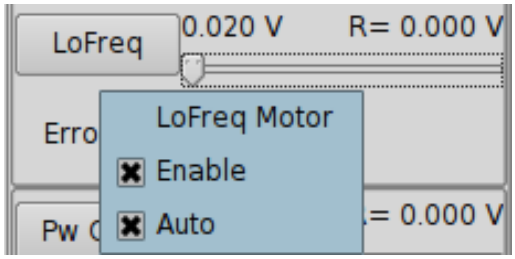
4.6.2 LO Simulation Window

The LO window displays the simulator for the LO.

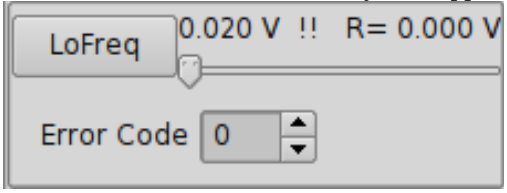


Motor simulator:
It simulates a CAN motor. It moves when position requests arrive.
You can simulate the following failures:

- The motor returns an error code: enter the error code in the Error Code spinbox.
- The motor is missing: right-click, and unselect *"Enable"*
- The motor answers, but does not move: right-click and unselect *"Auto"*



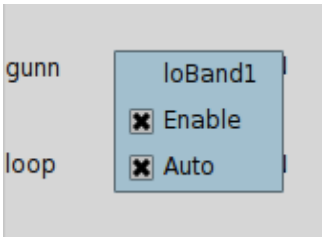
When *"Auto"* is unselected, a *!!* symbol appears.



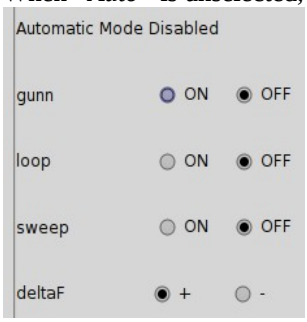
Adc simulator
It simulates a CAN ADC.
You can simulate a device missing error: right-click and unselect *"Enable"*

Dac simulator
It simulates a CAN DAC.
You can simulate a device missing error: right-click and unselect *"Enable"*

Lo Switches
It simulates the Lo switches.
You can simulate the following errors:
A device is missing error: right-click and unselect *"Enable"*
The device answers, but values do not switch: right-click and unselect *"Auto"*

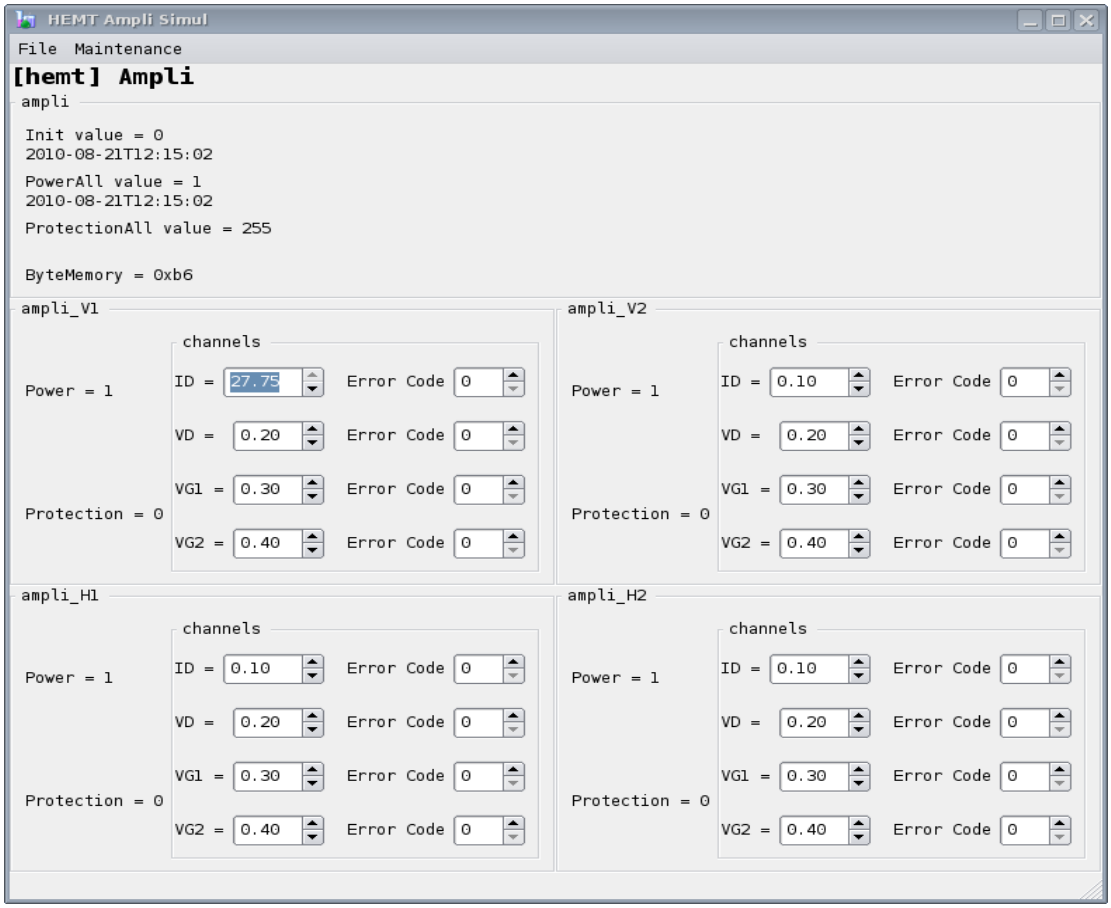


When *"Auto"* is unselected, a warning appears in the widget: *"Automatic Mode Disabled"*

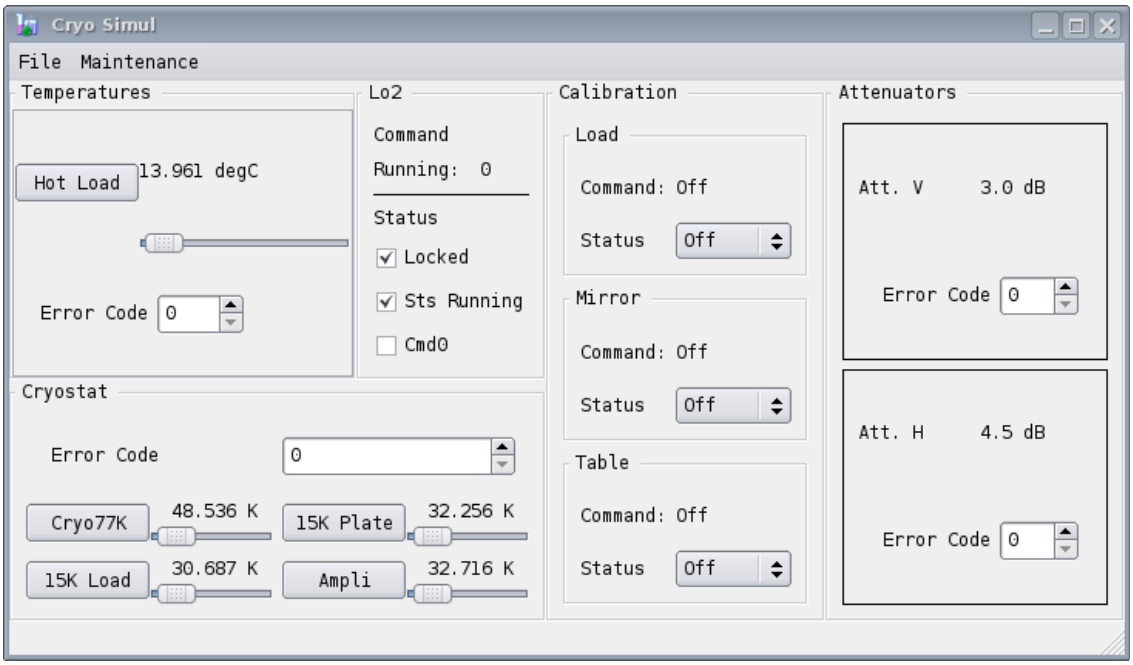


4.6.3 Ampli Simulation Window

This window simulates the amplifiers.



4.6.4 Cryo Simulation Window



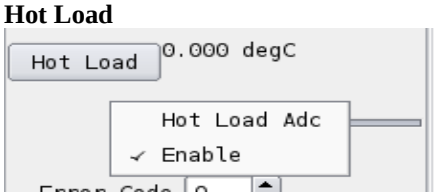
This window simulates:

- Hot load temperature
- Cryostat temperatures
- Calibration system

- Attenuators

You can simulate the following failures:
- The sensor returns an error code: enter the error code in the Error Code spinbox.
- The sensor is missing: right-click, and unselect *"Enable"*

Hot Load



Cryostat
This widget simulates the different cryostat temperature.
You can simulate the following failure:
- the sensor is missing: right-click, and unselect *"Enable"*

Calibration system
This widget simulates the different cryostat temperature.
You can simulate the following failure:
- The calibration system is missing: right-click, and unselect *"Enable"*

Attenuators
This widget simulates the attenuators.
You can simulate the following failures:
- The attenuators return an error code: enter the error code in the Error Code spinbox.
- The attenuators are missing: right-click, and unselect *"Enable"*

5 User Programs

This section describes the user programs. They are installed in `/home/introot/hemt/bin`.
There are also debug versions of these programs (`.Debug` suffix)
The data files are installed in `/home/introot/hemt/data`

5.1 hemt-i2c-reset

`hemt-i2c-reset` sends a CAN message to reset the CanI2c board.

5.1.1 Syntax

```
$ hemt-i2c-reset -h
hemt-i2c-reset - Reset I2C bus
Usage: hemt-i2c-reset [options]
Options:
  -v              Display version information
  -h, -?          Display help
```

5.1.2 Example

```
$ hemt-i2c-reset
Reset command sent
```

5.2 UtilCan

For a complete description, see document *can-ip.pdf*

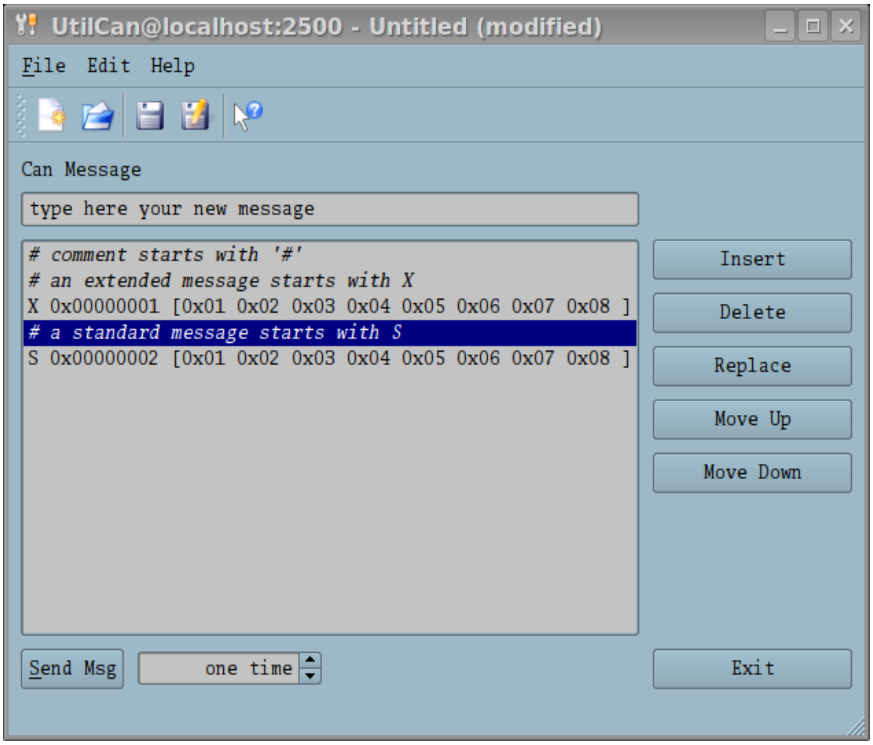
5.2.1 Syntax

```
$ UtilCan -h
UtilCan - CAN Utility to read/write CAN messages
Usage: UtilCan [options]
Options:
  -p=N                UDP port to contact (mandatory)
  -f=filename         File to load (optional)

  -v                  Display version information
  -h, -?              Display help


Example:
        UtilCan -p=2500 -f=myfile.txt
```

5.2.2 Screenshot



5.3 CanLogger

It is a CAN monitor tool, that can optionally decode the CanID into symbolic names.
For a complete description, see document can-ip.pdf

5.3.1 Syntax

```
$ CanLogger -h
```

```
CanLogger - CAN logger
Usage: CanLogger [options]
Options:
  -p=N                UDP port to contact (mandatory)

  -v                  Display version information
  -h, -?              Display help


Example:
        CanLogger -p=2500

Note: If the environment variable CAN_DB_FILE is set,
the program loads the database to decode CanID into symbolic names.
```

5.3.2 Example

```
$ CanLogger -p=2501
Settings:
Port= 2501
DatabaseFile= /home/introot/hemt/data/hemt.db

Load data from /home/introot/hemt/data/hemt.db
2010-04-16T16:24:26.307: msg 1 : ampli_getByteMemory : X 0x010c0210 []
2010-04-16T16:24:26.307: msg 2 : ampli_H1_VD_get : X 0x010c0291 []
2010-04-16T16:24:26.307: msg 3 : ampli_H2_ID_get : X 0x010c0294 []
2010-04-16T16:24:26.307: msg 4 : ampli_H2_VD_get : X 0x010c0295 []
```

5.4 Lo

This program tunes the local oscillator.

5.4.1 Syntax

```
HEMT Lo - Tune Local Oscillator
Usage: hemt-lo [options]
Options:
  -f=frequency    Specify the LO frequency in GHz
  -d=[-|+]        Specify the deltaF, '+' or '-'. Default is '-'.

  -v              Display version information
  -h, -?          Display help


Example:
        hemt-lo -f=70.0
```

5.4.2 Example

```
$ hemt-lo -f=70
Setting for this tuning:
        bandNum = 2
        flo     = 70.000 GHz
        deltaF  = MINUS
FGUNN= 70 GHz
```

```
Load settings from h276.hemt
Step 1: Configure the LO in safe mode

Step 2: Set Motors and DACs
LO settings:
        AttH = 4.5
        AttV = 4
        FGunn = 70
        GunnBias = 7.8
        HarmMixerBias = 0.1
        HarmMixerPower = 0.4
        LoFreq = 5.542
        LoPower1 = 6.5
        LoPower2 = 9
        LoopGain = 4.747
        PowerGunn = 4.1

Step 3: Close Loop and optimize LoFreq
Optimal loFreq = 5.521

Step 4: Set Offset Voltage and Gunn Bias
Increase loFreq until OffsetVoltage < 5.00
loFreq = 5.5210 ; offsetVoltage = 4.0625
Increase gunnBias until OffsetVoltage > 5.00
Optimal gunnBias = 7.80968

Step 5: Find max PllIfLevel(harmMixerBias)
Max found: harmMixerBias = 1.1, pllIfLevel = 9.99985
Tuning Ok

Step 6: Set the attenuators
End of tuning
```

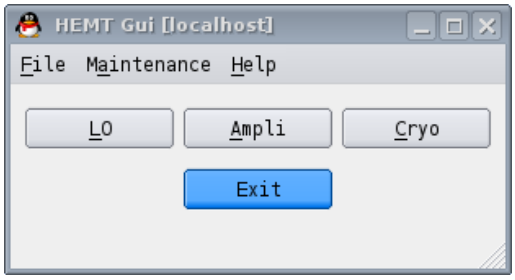
5.5 Gui

This program is specially designed for the front-end laboratory. It provides a graphical user interface (gui) for each receiver component.

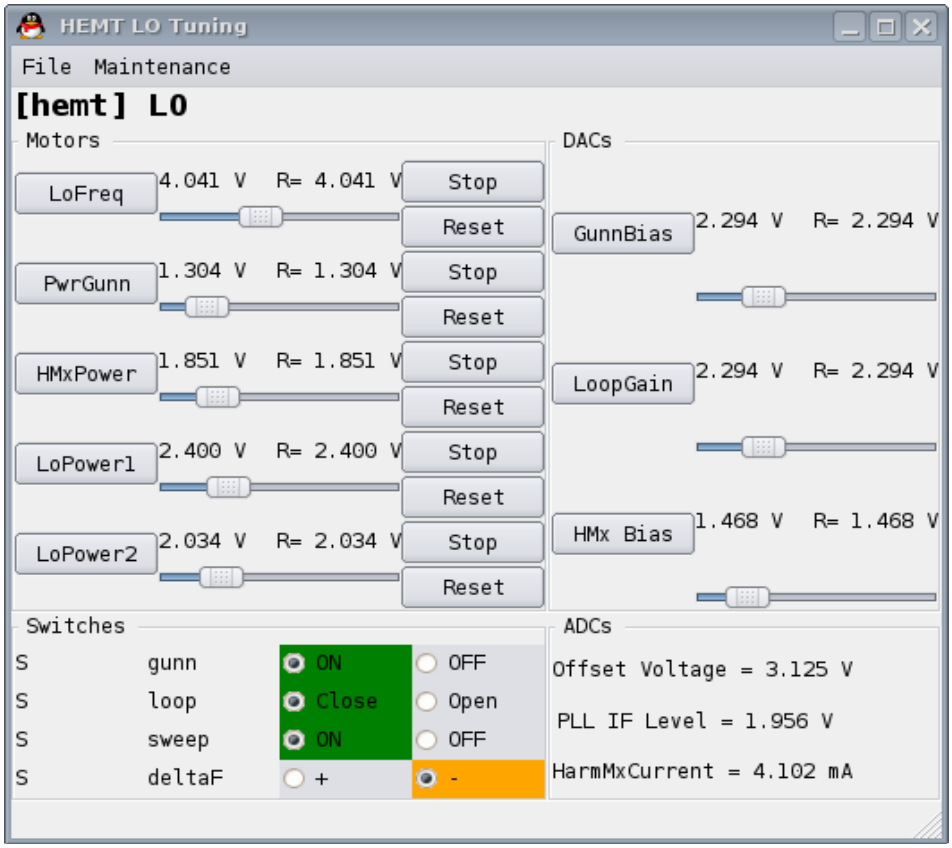
Syntax

hemt-gui

5.5.1 Main window



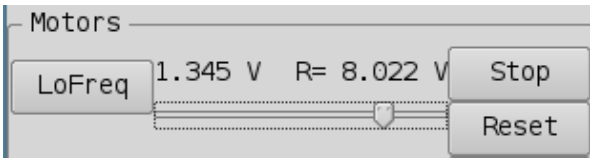
5.5.2 Lo window



Motor widgets (LoFreq, PwGunn, HmxPwr, LoPower1, LoPower2)

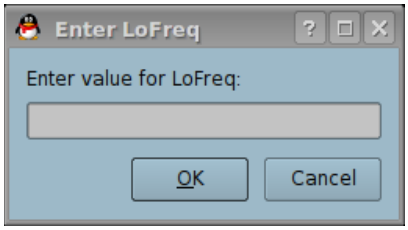
This widget is used to drive the motor, and to display the current position.

Description



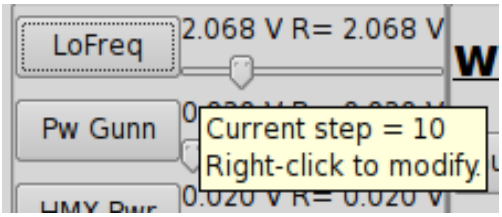
The requested value is displayed with a R prefix (here: R= 8.022).
The current position with no prefix (here: 1.345).
There is also a stop button and a reset button.

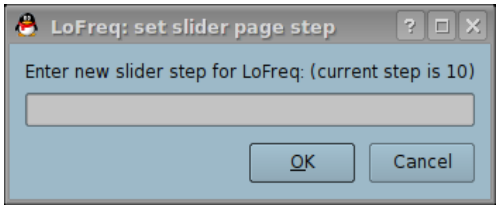
To modify the motor position , you can:
•Click on the button name to open a dialog box to enter the new motor value
•Move the slider



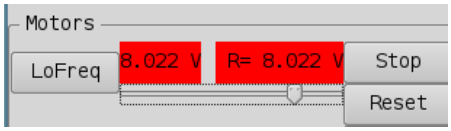
Motor dialog box

You can change the slider step by right-clicking on it



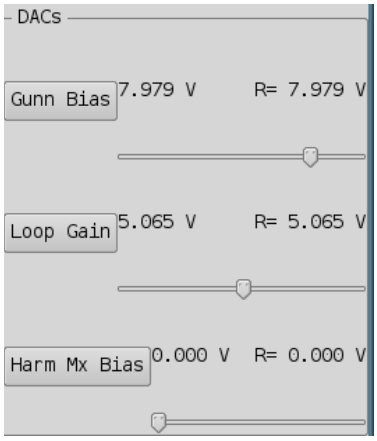


The unit for the slider is in motor raw unit (totally different from the motor unit which is displayed in Volt)



If the motor is disconnected from the CAN bus, the labels become red to indicate a problem.

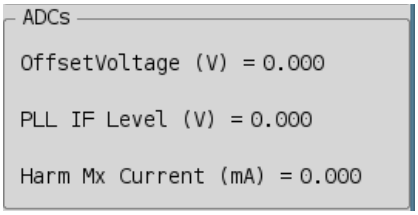
DAC widget (GunnBias, LoopGain, HarmMxBias)



This widget is used to drive the DAC, and to display the current position.

Description
From the user point of view, a DAC is similar to a motor with an infinite speed.
So, the motor widget description applies also to the DAC widget.

ADC widget (OffsetVoltage, PLL IF Level, HarmMxCurrent)

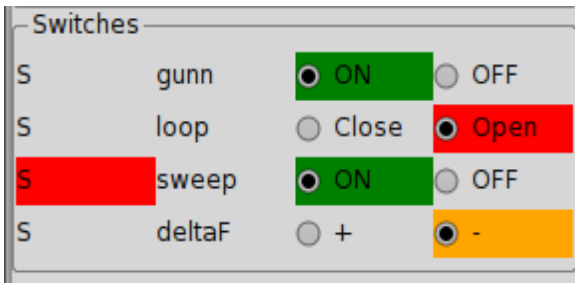


This widget is used to display the current ADC value.

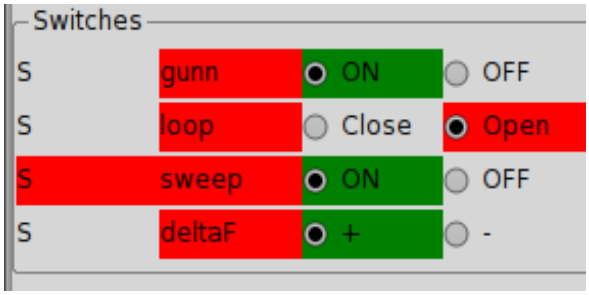
Lo Switches widgets

This widget is used to command the LO switches and to display the status.

Description
Each radio-button pair represents a LO switch. It is a realistic representation of the LO physical front panel: color and switch order are taken from the LO hardware.

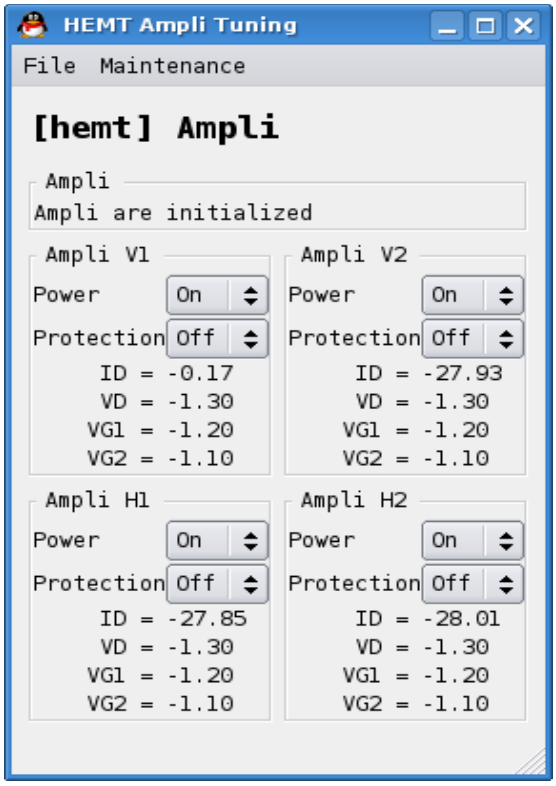


The radio button displays the current command applied on this switch.
For each switch, if the command matches the status, the status label (the S letter on the left side) is displayed with a normal background; otherwise this label is displayed with a red background.
Here the status for Sweep is red. It means that the status does not match the command.



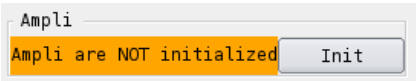
If the LoSwitches device does not answer at all, the switch names (gunn, loop, sweep, deltaF) become red to indicate a problem.

5.5.3 Amplifiers window



This window displays the amplifiers currents and voltages.

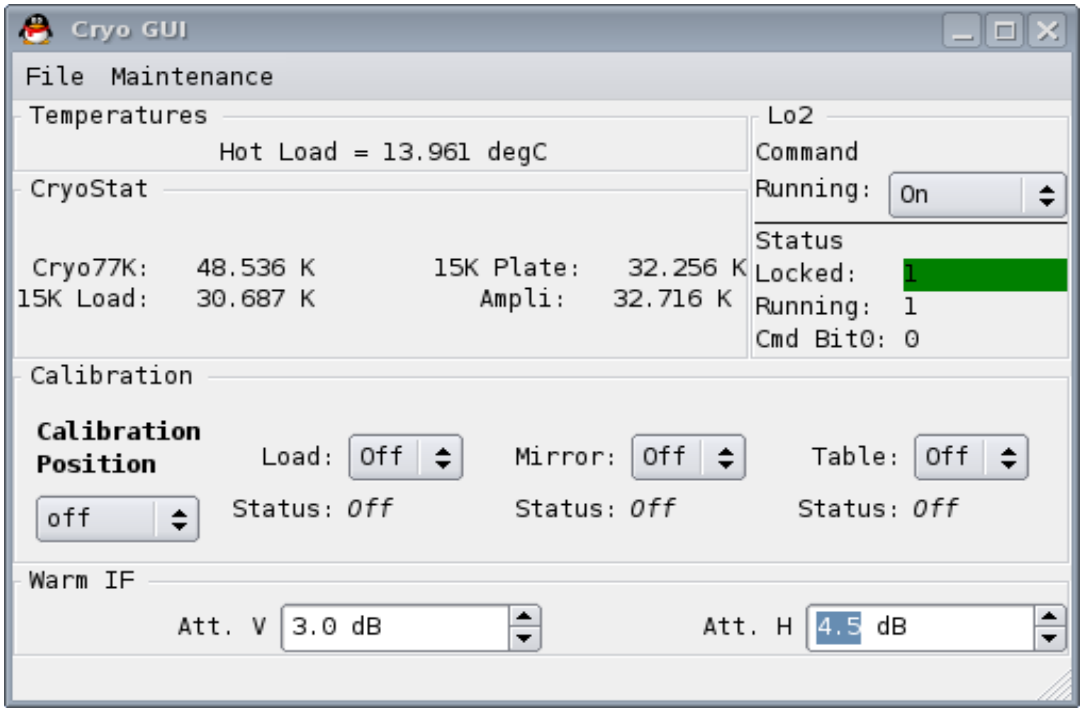
Amplifiers initialization
If the amplifiers are not initialized, a warning message and a button *Init* appear. Click on the button to initialize the amplifiers.



Summary
The amplifiers work only when all the following conditions are satisfied.

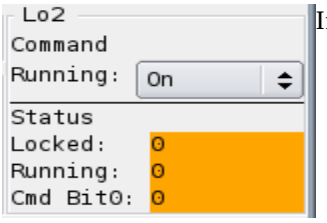
- The amplifiers are initialized
- the physical switch (on the amplifier box) on the HEMT receiver is on the *Unprotected* position.
- the software power is ON
- the software protection is OFF

5.5.4 Cryo window



This window displays

- the cryostat temperatures
- the calibration commands
- the Lo2 commands
- the attenuators commands

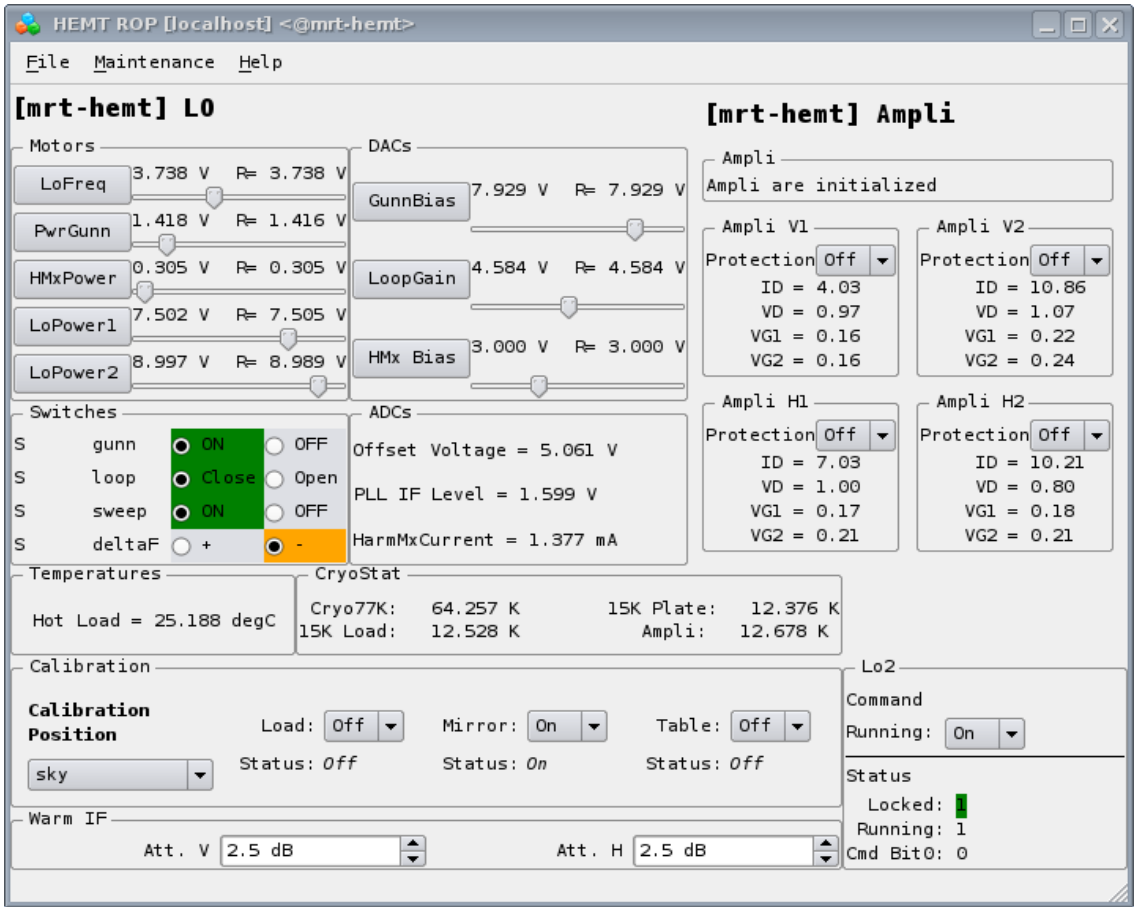


If the Lo2 is unlocked, the widget becomes orange.

5.6 Rop

Rop (Receiver OPerator) is a special version of `hemt-gui`.
All components are grouped on only one window,

The target audience for this program is the IRAM 30M telescope operators.



See `hemt-gui` section for `hemt-rop` usage instructions.

5.7 hemt-GetStatus

`hemt-GetStatus.py` is a small program that send a `receiver.getStatus()` to the hemt-server, and then print the result on the standard output.

5.7.1 Syntax

```
$ hemt-GetStatus.py -h
Print receiver status
Syntax:
    hemt-GetStatus.py options

Options
    -s=serverName    Default=localhost
    -h, -?           Print help
```

5.7.2 Example

```
$ hemt-GetStatus.py
# Connect to http://localhost:1080
status.attenuatorH                  0.0
status.attenuatorV                  0.0
status.deltaf                       0
status.gunn                         1
```

```
status.loop                       0
status.sweep                      0
status.temperature.Amp15K         11.952319
status.temperature.Band1          12.714197
status.temperature.Band3          12.619856
status.temperature.Band4          12.333979
status.temperature.ColdLoad       35.994822
status.temperature.Cryo15K        35.972908
status.temperature.Cryo4K         12.79326
status.temperature.Cryo77K        48.536285
status.temperature.hotLoad13      273.1
status.temperature.hotLoad24      273.1
```

5.8 Check software

`hemt-check-software.py` is a small program to check if all the HEMT programs run normally:

5.8.1 Syntax

```
$ hemt-check-software.py -h
hemt-check-software.py - Check hemt software status
Usage: hemt-check-software.py [options]
Options:
  -h,-?             Print this help
  -v                Print version

Run hemt-check-software.py without options to start checkings.
```

5.8.2 Example

```
$ hemt-check-software.py
==========================
Check HEMT software
==========================
Check Can Controllers:
tdrv011drv            21550  2
Can Controllers: Ok

Check CanManager:
CanManager: Ok

Check database:
CAN_DB_FILE='/home/introot/hemt/data/hemt.db'
Database: Ok

Check hemt-server
hemt-server: Ok

HEMT Receiver: Ok
```

5.9 hemt-SetProtection.py

`hemt-SetProtection.py` is a command line program to set/unset the amplifiers protection.

5.9.1 Syntax

```
$ hemt-SetProtection.py -h
Usage: hemt-SetProtection.py [options]

Set HEMT Amplifier protection

Options:
  -h, --help            show this help message and exit
  -s SERVERNAME, --server=SERVERNAME
                        XML-RPC server name. Default=localhost
  -a AMPLI, --amplifier=AMPLI
                        amplifier name (all, ampli_V1, ampli_V2, ampli_H1,
                        ampli_H2)
  -p PROTECTION, --protection=PROTECTION
                        Protection value (0 -> Off, 1 -> On )
```

5.9.2 Example

```
$ hemt-SetProtection.py --amplifier=all --protection=0
connect to http://localhost:1080
ampli = all
protection = 0
result =  0
```

5.9.3 Alternative methods

There are two other ways to set/unset the amplifiers protection:
- by using the graphical program (`hemt-rop` or `hemt-gui`)
- by using the XML-RPC procedure `ampli.setProtection`

6 Daily Operation

6.1 Modify database configuration

The configuration settings are stored in several SQL files in directory `/home/introot/hemt/data/`. Normals users are interesting only by the filenames starting with prefix "`conf-`". The others filenames are for developers only.

To modify a setting, edit the appropriate file and then run `hemt-update-db.sh` to update the database.

```
$ hemt-update-db.sh
    cd /home/introot/hemt/data
    rm -f hemt.db
# Update hemt.db ...
    sqlite3 hemt.db < ./00-canid.sql
    sqlite3 hemt.db < ./conf-cryo.sql
    sqlite3 hemt.db < ./conf-lo.sql
    sqlite3 hemt.db < ./converters/LinearConverter.sql
    sqlite3 hemt.db < ./converters/RawConverter.sql
    sqlite3 hemt.db < ./devices/Amplis.sql
    sqlite3 hemt.db < ./devices/CanAdc.sql
    sqlite3 hemt.db < ./devices/CanButton.sql
    sqlite3 hemt.db < ./devices/CanDac.sql
    sqlite3 hemt.db < ./devices/CanMotor.sql
```

```
    sqlite3 hemt.db < ./devices/CanRegister.sql
# OK
```

Then you have to restart the applications.

Note: You should notify me by email each time you modify SQL file, so that I can archive it in the SVN repository. Otherwise your modifications may be lost after a reinstallation.

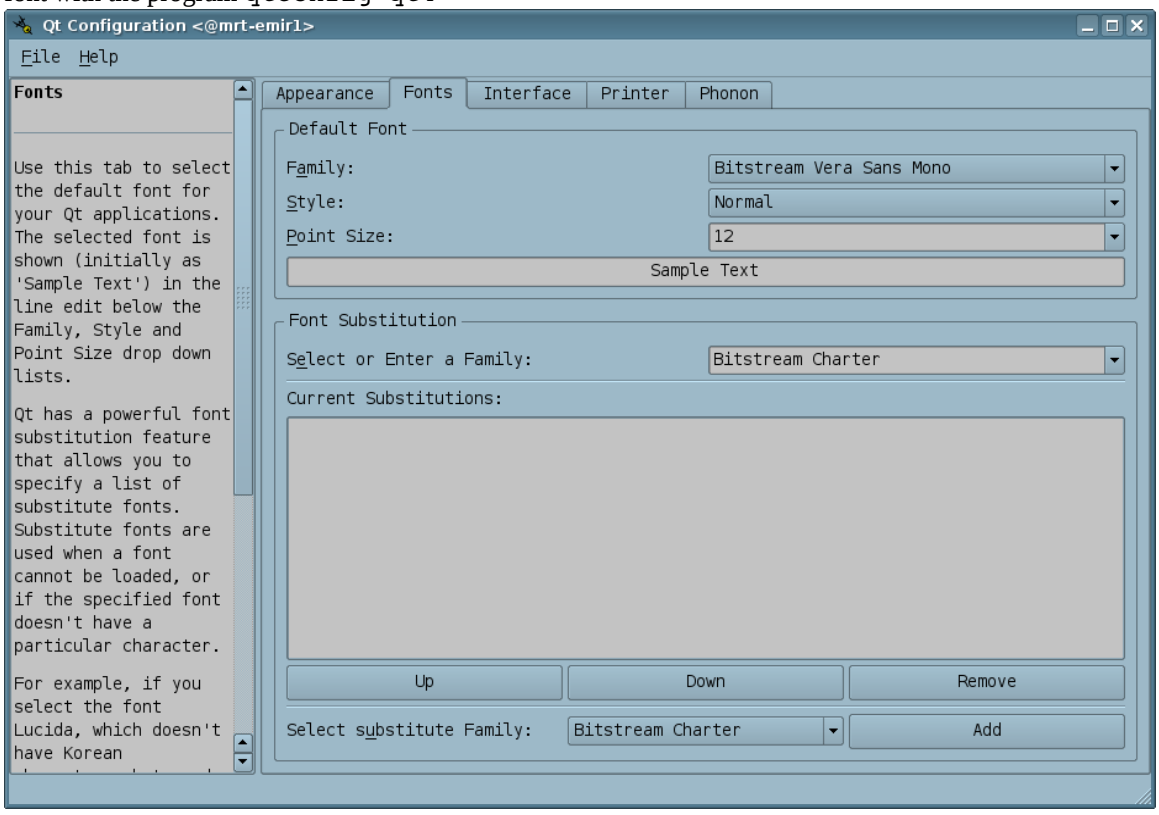
6.2 LO data files

The LO data files are in `/home/introot/hemt/data/tuning`
If you add a new file in this directory, you have to specify its names in the appropriate SQL configuration file (`/home/introot/hemt/data/conf-*.sql`).

7 Tips

7.1 How to change the fonts size ?

The graphical program use the default setting from your window manager, but you can change the default font with the program `qtconfig-qt4`



To have a nicer display, you should select a fixed-width font. I recommends to use *Bitstream Vera Sans Mono*, with size=10 or size=12. (on Debian this font is in the `ttf-bitstream-vera` package)

8 Troubleshooting

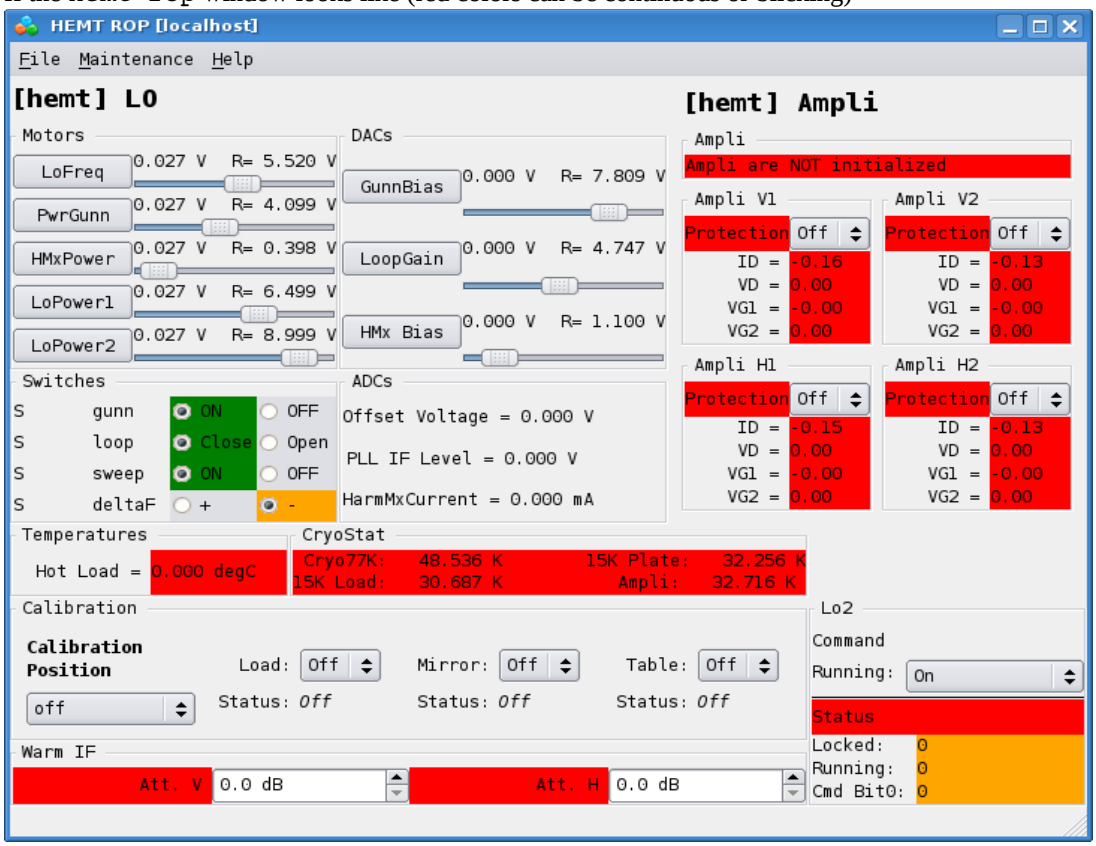
8.1 IPv6

It seems that CanManager does not work when IPv6 is enabled.
On debian you can disable IPv6 with the following commands:

```
# echo net.ipv6.conf.all.disable_ipv6=1 > /etc/sysctl.d/disableipv6.conf
# /sbin/reboot
```

8.2 Procedure to reset the I2C bus

If the `hemt-rop` window looks like (red colors can be continuous or blicking)



It means that the I2C bus has crashed, i.e. a I2C module hangs the I2C bus for ever.
Consequence: the receiver is still running, but you cannot send any new command to the I2C modules until you reset the I2C. bus

Procedure to reset the I2C bus
- Since it is impossible to reset the I2C bus remotely, you have to climb up into the cabin.
- Go to the receiver back
- On the box *HEMT 3mm BIAS* (a black box on the top of the cryostat), and switch the protection switch to *Protected* (up position)
- Go back to the receiver front
- Switch OFF the CANI2C rack (square button on the top)
- Wait 5 seconds
- Switch ON the CANI2c rack
- Go to the receiver back
- On the *HEMT 3mm BIAS* box, switch the protection switch to *Unprotected* (down position)