# How to adjust the LNA bias values

## Intro:

This document describes how to adjust the LNA bias values for the Antonio Feeds. This is necessary when setting up a new feed and also periodically for all feeds in case that the values change. Note that we have two different types of LNAs installed in the Antonio Feeds and each version requires their individual voltage and current bias settings.

**NOTE:** A wrong bias setting can destroy an LNA, hence this needs to be done very carefully!

**NOTE:** Do not apply room temperature bias settings to cryogenically cold LNAs, this can lead to broken LNAs!

**NOTE:** Be very careful when setting up the bias level, if you are unsure about anything, please contact me and ask!

## **Connect to PAX box:**

## Location of code:

1 - ssh ataant@control

2 – ssh 5e

3 – telnet pax

4 – help (sometime this command needs tob e send twice )

help

help

SYNOPSIS

help [command]

DESCRIPTION

shows help information for specific PAX controller commands:

getpam - get PAM attenuator levels for X or Y channel

setpam - set PAM attenuator levels for X or Y channel

getdet - get X or Y channel power detector mean value

lnabiasoff - turn off X and Y channel Vg, Vd, and Vm

lnabiaslatch - turn on (latch) X and Y channel Vg, Vd, and Vm

getvg - get mean LNA Vg bias voltage for X or Y channel

setvg - set LNA Vg bias voltage for X or Y channel

getvd - get mean LNA Vd bias voltage for X or Y channel

setvd - set LNA Vd bias voltage for X or Y channel

getvm - get mean LNA Vm bias voltage for X or Y channel

setvm - set LNA Vm bias voltage for X or Y channel

getid - get mean LNA Id current (mA) for X or Y channel

lnabiasstore - store LNA bias settings in non-volatile memory

(getstatus) - list all LNA bias measurements and other info

gettime - get PAX controller date and time

getonboardtemp - read PAX controller temperature sensor

reset - reset PAX controller

getsoftwareversion - get version of software stored in ip2022 flash

getiposheapstatus - show statistics for ipOS internal heap

getiposnetpagestatus - show statistics for ipOS internal netpages

help - show help information for commands

Note: commands in parentheses are not implemented

EXAMPLES

show help information for getsoftwareversion command:

help getsoftwareversion

OPTIONS none prints values to stdout

## Get correct LNA information for particular feed:

First check which LNAs are in the antenna / feed, access the following file:

The \_feedpartsinventory excel sheet is located at: <https://github.com/SETIatHCRO/Front-Page/blob/master/Antonio-Feed/__FeedPartsInventory.xlsx>

Check what feed is intalled in the antenna, then check what pyramid is installed in the feed, and then check what LNAs are installed in the pyramid.

After that locate the LNA datasheet for the corresponding LNAs, which are located here:

<https://github.com/SETIatHCRO/Front-Page/tree/master/Antonio-Feed/_LNA%20SN%20Datasheets>

Open the data sheet and find the LNA bias values when operated at cryo temperatures (in this example we look at the values for an IAF LNA which has a higher current setting compared to the LNF LNAs):

Table

Description automatically generated

NOTE: IAF LNAs are marked with “F” in the excel sheet, if you apply the IAF bias settings to a non IAF LNA, this will damage the LNA!

The cryogenical bias values for an LNF LNA are following:

Table

Description automatically generated

The QRFH prototype has different LNAs too:

Table

Description automatically generated

NOTE: The bias settings for the QRFH need to be adjusted for the operation at 70K compared to the standard data sheet!

Use following settings: Vds=1.20V and Ids=30mA

NOTE: Ids might not be reachable with the existing bias board!

## Procedure to set the correct bias level:

First: leave the LNA bias off, set the default values for the LNA via the command line (example here is for an IAF LNA):

1 - setvm x -0.75

2 - setvm y -0.75

3 - setvd x 1.4

4 - setvd y 1.4

5 - setvg x 0

6 - setvg y 0

Now switch on the bias supply and read back the values:

7 - lnabiaslatch

8 - getvm x (-0.73)

9 - getvd x (1.33)

Now adjust VD and VM for X and Y so that when reading back the values they show the correct voltages, by using setvm and setvd!

Next read the drain current and adjust VG so that ID equals the correct value.

10 - getid x (56.4)

11 - setvg x 0.2

…

12 - getid x (59.4)

13 - setvg x 0.12

…

14 – getid x (60.0)

Repeat for Y pol.

Finally read back all values and double check that all of the are correct:

15 - getvm x (-0.75)

16 - getvd x (1.4)

17 - getid x (60.0)

18 - getvm y (-0.75)

19 - getvd y 1.4)

20 - getid y (60.0)

When all values are correct store the settings!

21 - lnabiasstore

The exit the terminal.

22 - ^]

## Set PAX Box antenna mapping in SQL data base:

1 – ssh [root@data.hcro.org](mailto:root@data.hcro.org)

2 – mysql

3 – SHOW DATABASES;

4 – USE atadata;

5 – SHOW TABLES;

6 - select ant, pax\_box\_sn from feed\_parts; (show existing mapping)

7 - update feed\_parts set pax\_box\_sn ='PB-010' where ant='5e'; (map PAX 10 to antenna 5E)

8 - update feed\_parts set pax\_box\_sn ='NULL' where ant='5e'; (remove existing mapping)

9 - select ant, pax\_box\_sn from feed\_parts; (check new mapping)

10 – exit;

## Set PAX Box antenna mapping in Json file data base:

1 – ssh [atasys@control.hcro.org](mailto:atasys@control.hcro.org)

2 – cd /hcro/atasys/ata/etc/

3 - nano ants.json

Adjust all values, like PB number, Feed Number, DB and CB numbers to the correct installed components.

Timeline

Description automatically generated