

SOP for testing 15mtr Backend using ROACH @ NCRA, PUNE.

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I : Power ON and instrument settings.

- (a) Power on wall socket , AC distribution board in the RACK and power supply (*verify : PC ,Optical Fibre Rx units ,Analog bin & ROACH Unit are powered ON*)
- (b) Now Switch ON the instruments and do the following settings -
- (c) Signal generator settings as CLOCK to ROACH : Freq = 200MHz , Power = 0dbm, Set “Mod to OFF and RF to ON”
- (d) Wavetek Generator settings as 1 pps trigger for ADC : SQUARE standard waveform, FREQ 1 Hz , Amplitude 5 Vp (*default on power on*)
- (e) Power “ON” the ROACH unit by holding the switch at front panel 'ON' for few seconds.

II : Interconnections.

(A) Only for testing the Digital part.

- a. Inputs I+ & Q+ : Connect the output from Analog Noise source PIU to LPF of 100MHz or less. Then LPF output to 2 Way Power Divider (2WPD). Connect these two signals as inputs to I+ & Q+ ports of ROACH unit.
- b. PPS : Connect the Wavetek Generator's output of 1Hz,Square waveform & 5Vp to Sync input of ROACH unit.
- c. Clk : Connect the 200MHz , 0dbm to clk_i input of ROACH unit.

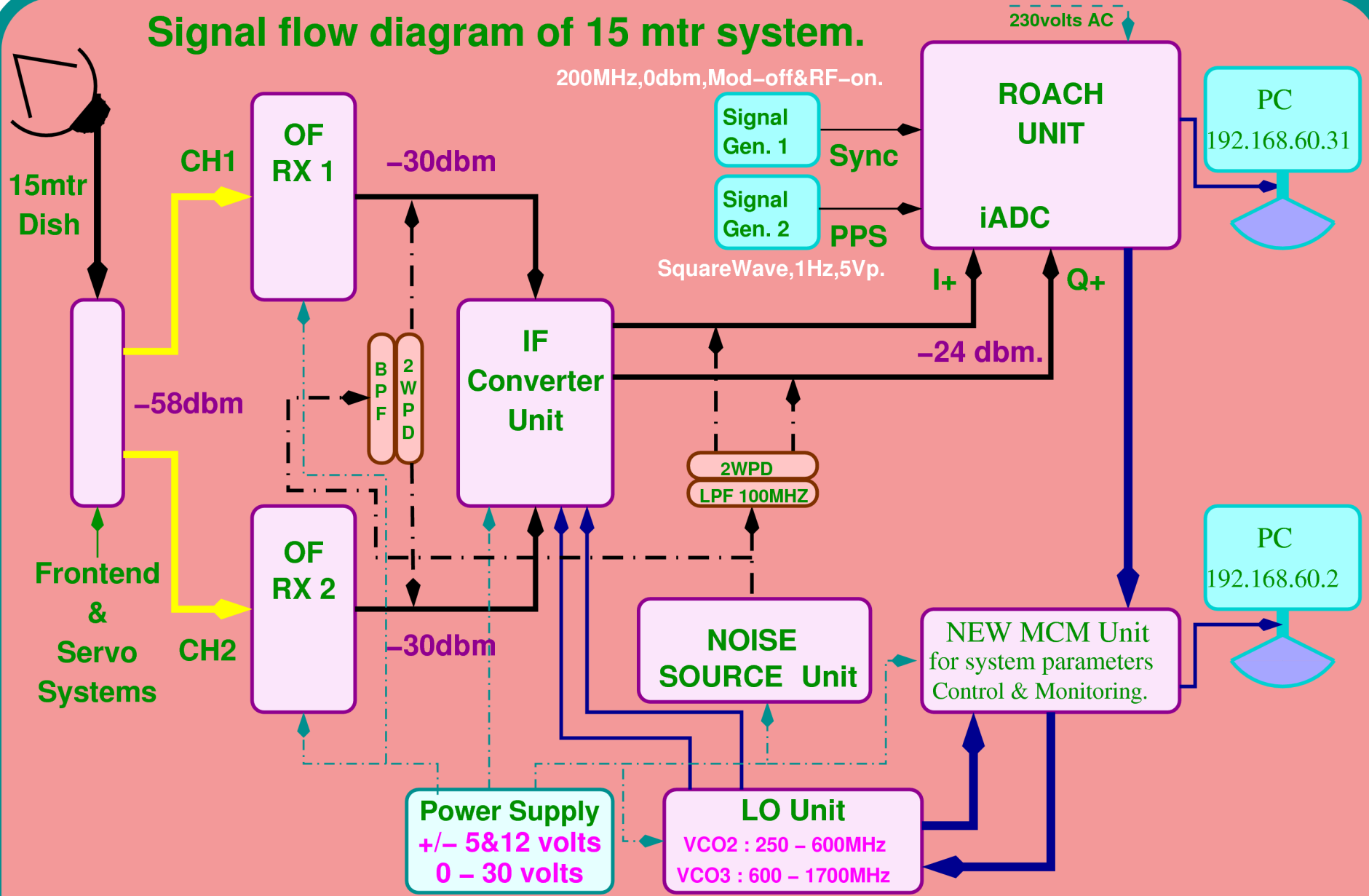
(B) For testing the 15mtr Analog & Digital backends.

This test can be done either using antenna signals or Noise Source through BPF of 100MHz or less bandwidth & 2WPD.

- a. 10MHz LO Ref : connect 10MHz REF OUT from Wavetek signal generator instrument's rear side to “ref in port” of the LO synth PIU in the Analog bin. (*verify : will be usually connected*)

Please refer the following “[Signal flow diagram of 15mtr.](#)” and do the interconnections using appropriate cables.

Signal flow diagram of 15 mtr system.



Note : Signal Powers mentioned in figure are Total Power over 100MHz Bandwidth.

III : “CONTROL & MONITORING GUI”.

Make sure signals - @OFC Rx units OUTPUT : -30dbm Total power over 100MHz Band.
@ROACH unit INPUT : -24dbm Total power over 100MHz Band.

a. start control and monitoring GUI by the following way :

i. web-browser - <http://192.168.60.2:8080/cms-web/> user : sigcon passwd : sigcon

The GUI has the following menu bar :

HOME DASH BOARD MESSAGE CONSOLE ALARM ENGINEERING INTERFACE SETTINGS INFORMATION LINKS

ENGINEERING INTERFACE has the following submenus :

dataserver backend servo sigcon frontend sentinal

each of these displays the following informations :

Status Monitoring Parameters Raw Parameters Basic Commands Detailed Commands Trend Plot

b. Select Engineering Interface / frontend.

Basic commands / RFBAND : to set the RF band.

Bands are (MHz) : 1170 , 1280 , 1390 & 1660*

Basic commands / RFATTN : to set the RF attenuation

By default “0”.

c. Select Engineering Interface / sigcon.

Basic commands / set lo : to set the LO.

Always set the LO 60MHz less than RF band selected.

Basic commands / set attn : to set the Attenuation.

Default attenuation 4 dbm for both the channels.

d. Select Engineering Interface / backend.

Basic commands / INIT : to Initialize the ROACH Unit.

Feed the following information.

adcclock fftlen acqinteg fftshift stainteg sampgain channelstart channelstop channelincr sampgainctrl stokes chanavg
submit default values.

Home / CMS control / Date monitor / Plot : Spectral line display --> start : refresh time for plot is 30 seconds.

* to set the 1660 RF band enter value as 1060.

IV : Testing through “CONTROL PC”.

(A) Control PC Login and Settings.

- a. LOGIN in to ctrl PC as user : sandeep / gmrt passwd : sandeep123 / gmrt123
- b. Open two Xterm windows (*one for Backend control, one for Offline plotting*)
- c. Backend control terminal [sandeep@sdippc ~]# cd /home/sandeep/15mtr_backend/PY_SCRIPTS/ROACH/
 Dump data in the directory [sandeep@sdippc ~]# cd /home/sandeep/15mtr_backend/DATA/
- d. Offline plotting terminal [sandeep@sdippc ~]# cd /home/sandeep/15mtr_backend/TAX/

(B) Initialization, plotting and data dumping.

In the Backend control terminal

(a) **initialisation.**

```
[sandeep@sdippc PY_SCRIPTS/ROACH]# ./wb_init_200mhz.py -h
Usage: wb_init_200mhz.py <ROACH_HOSTNAME_or_IP> [options]
Options: -h, --help                    show this help message and exit
-b BOFFILE, --bof=BOFFILE            Specify the bof file to load
-A ANTA, --anta=ANTA                Antenna "a" Integer Delay
-B ANTB, --antb=ANTB                Antenna "b" Integer Delay
-C SCALE, --ant1=SCALE              Antenna "a" Scaling factor
-D SCALE1, --ant2=SCALE1            Antenna "b" Scaling factor
-F FFT_SHIFT                        FFT shift value
-I ACC_LEN                          Integration Time
```

eg. ./wb_init_200mhz.py 192.168.4.10 Note : this will take default value set in the program for other options.

(b) **Online plotting**

```
[sandeep@sdippc PY_SCRIPTS/ROACH]# ./wb_poco_plot_200mhz_ts.py -h
```

```
Usage: wb_poco_plot.py <ROACH_HOSTNAME_or_IP> [options]
```

```
Options:
```

-h, --help *show this help message and exit*
-l, --log *Plot the power in logarithmic scale (requires some non-zero value signal).*
--hold *Turn on hold. This will plot subsequent spectra on top of each other.*
-f FILE, --file=FILE *file dump the data in native tax format*
-t FILE, --file1=FILE *Time Stamp Record File*
eg ./wb_poco_plot_200mhz_ts.py -l
(verify : A separate window with “live” self plots will appear within a few seconds)

(c) Data dumping for offline plotting with tax

[sandeep@sdippc PY_SCRIPTS/ROACH]# ./wb_poco_plot_200mhz_ts.py -f <../DATA/file_name>
(verify : Output data file with <filename> in cd /home/sandeep/15mtr_backend/DATA/)
(keep this xterm open for control of backend)

(C) Offline Analysis using tax

(a) Open Offline Plotting terminal

(b) Plot self spectrum for Ch 1 – 1000

[root@sdippc TAX]# ./xtrgsb32 -v ../DATA/<file_name> -c 1,1000 -t 1,10000

(c) Plot cross spectrum for Ch 10 – 1000

[root@sdippc TAX]# ./xtrgsb32 -v ../DATA/<file_name> -c 10,1000,1 -t 1,5,1,5 -n 1 -r C00

(d) Plot cross Ch – 300 over time

[root@sdippc TAX]# ./xtrgsb32 -v ../DATA/<file_name> -c 300 -t 1,100000000 -n 1 -r C00

(e) Plot required records

[root@sdippc TAX]# ./xtrgsb32 -v ../DATA/<file_name> -c 10,1000,1 -t 1,57,1,57 -n 1 -r C00

(keep this xterm open for Offline plotting)