

A large radio telescope dish, likely the Giant Metrewave Radio Telescope (GMRT) in India, is shown in a landscape. The dish is a complex metal lattice structure mounted on a tall, tapered concrete pedestal. It is positioned on a grassy field next to a calm body of water, which perfectly reflects the entire structure. The background shows a clear blue sky and some distant greenery.

# *Telescope Operation Manual*

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## 1 How to start the ONLINE

To start *ONLINE*:

1. Start the *Master*
2. Start *ONDISP*
3. Start *COMH* i.e. communication handler
4. Start *subarray-0* with USER0 for all antennae
5. Start *subarray-1* with USER1 for CEB
6. Start other users

**NOTE:** While giving commands please observe the ONDISP window.

### a) Starting ONDISP

Start the ONDISP window by giving the command `ondisp` on any bhaskar terminal.

```
> ondisp
```

### b) Start the MASTER

First of all kill all running processes of ONLINE by giving command `killon -a`.

Open any new terminal in BHASKAR and give following commands

```
> work
> ./ONLINE & ~onsoft/data/3jun.dat
```

From here the MASTER window will start.

Then it will ask for the user ID,

```
user ID ?
>40
```

Then to start the the 3<sup>rd</sup> june log (i.e. Today's log)

```
> startup '3jun.log'
```

### c) **Setting up the communication of *antennas* with the *COMH***

We have to start ROUTER first on the BHASKAR machine.

Give the following commands,

```
> ssh router@jupiter
password:.router
> rtrlinux &1
```

Click the *record* file option and enter a filename as,  
rtr\_3jun.dat

Give

```
> scctask          command in MASTER.
```

Click *Start* on the ROUTER interface.

After starting the ROUTER go to MASTER window and type,

```
> stcomant
```

### d) **To start USER0 window**

In the same i.e. MASTER window you type

```
> strtproc 'user0'
```

And watch ONDISP.

After this command it will give the token no. say=xxxxxxxxxx

Now you have to open new terminal on BHASKAR & type in that,

```
> work
> USER0 > & ~onsoft/data/u0_3jun.dat
```

Again it will ask for user ID,

```
user ID ?
>40
```

Then to connect the user0 to ONLINE give,

```
>userconn
```

Now it will ask for token no. ? Give the token no. as

```
>xxxxxxxxxx
```

Inserting all antennas in user0:

```
>allant
>cp 0
>defs 0          defining subarray 0
```

---

<sup>1</sup> This will start router interface in background.

```
>suba 0          calling subarray 0
>sndsacant send antenna mask to specified subarry 0
```

Watch the ONDISP window.

### **e) To start the USER1 window**

We have to give follwing commands in USER0

```
>strtproc 'subac1' it will start subarray 1.
```

Now to add CEB in the USER1

```
>ante 1 0
>cp 0;defs 0;suba 0
>sndsacant
>strtproc 'user1'
```

Then it will give the token no. in the USER0 window say=yyyyyyyyyyy

Open new terminal on the BHASKAR & give the commands,

```
>work
>./user1.5
```

It will ask for user ID,

```
user ID ?
>40
>userconn
```

Give the token no. which is displayed in the USER0 window.

```
Token no.?
>yyyyyyyyyyy
>ante 1 0
>cp 0;defs 0;suba 0
>sndsacant
```

### **f) To start the USER4**

Give following commands in USER0,

```
>strtproc 'subac4'
>allant
>cp 0;defs 4;suba 4
>sndsacant
```

It will give the token no. say=zzzzzzzzzzz

Go to ADITYA machine and on that login to the BHASKAR machine & in that you type,

```
>work
>./user4.5
user ID ?
>40
>userconn
```

Give the token no.

```
Token no. ?
>zzzzzzzzzzz
>allant
>cp 0;defs 0;suba 0
```



```
>sndsacant
```

So this way you can start the ONLINE and the output can be seen on ondisp window.

## 2 ONDISPLAY

On-display is a very important utility which interfaces the user to the system. It gives the status of the all antennas and their all sub-systems every second. Using this interactive module user always can know observatory status.

The ondisplay has following general commands:

```
>help
```

To see what type of display windows/ commands are available.

```
>sels n
```

Select sub-array number n (n=0, 1, 2, 3, 4, 5).

```
>sela n
```

Select antenna having ABC ID (refer Appendix 14.1) n.

```
>sela c00
```

Select antenna C00 i. e. you can select antenna with name also. Name should be three character wide.

```
>sela 77
```

Enables selective ABC messages.

```
>sela 33
```

Enables all ABC messages.

```
>redr
```

Redraw / refresh the selected window for display.

### 2.1 *Ondisplay commands with figures*

This topic explains the command generated monitoring windows with their figures.

>gens

This gives us the general status of antennae i.e. distribution among various sub-array and their configuration. Configuration means under which sub-array how many antennae are defined.

DATE: 2005aug9

TIME: 16: 5:16

LST: 12:43:33.2

PACKET: 3245707

USR4 3244949

user4.5: ABC SET TIME16:00:58,09-08-2005

gens

COMH USING

0

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

CEB C00 C01 C02 C03 C04 C05 C06 C08 C09 C10 C11 C12 C13 C14 E02 E03 E04

SUB0 PERM C00 C01 C02 C03 C04 C05 C06 C08 C09 C10 C11 C12 C13 C14 E02 E03 E04 E05

USR0 USIN C00 C01 C02 C03 C04 C05 C06 C08 C09 C10 C11 C12 C13 C14 E02 E03 E04 E05

SUB1 PERM CEB

USR1 USIN CEB

SUB4 PERM C00 C01 C02 C03 C04 C05 C06 C08 C09 C10 C11 C12 C13 C14 E02 E03 E04 E05

USR4 USIN C00 C01 C02 C03 C04 C05 C06 C08 C09 C10 C11 C12 C13 C14 E02 E03 E04 E05

DATE : Shows current date. TIME : Shows current indian standard time. LST : Shows the local sidereal time.

ABC SET TIME : Shows the time of latest updated time for ABC (Antenna Base Computer). PACKET : Packets received by the online through COMH.

If any antenna is not in the SUB-ARRAY and it is in USER then all the commands which you give will not reach to that antenna , similarly if any antenna is in the SUB-ARRAY and not in the USER, still all commands will fail for that antenna. Therefore SUB N and USR N must contain identical elements.

>coms

Shows COMH status.

-----			
DATE: 2005aug9	TIME: 16:58: 9	LST: 13:36:34.9	PACKET: 3255220
SAC4 3254530	subac4.5: ABC	SET TIME16:54:15,09-08-2005	
coms			
-----			
-----			
	COMHSTAT		
Debug Mode :	Disabled	Broadcast Cmds Issued:	0
Comh cycle time:	20	Abc Pkts Rcvd:	6573344
Prog Ver:		Pkts To Unix :	1078644
Abc Timeouts:	7287	Pkts To ABC:	23059
Abc Chksums:	279	BR CMDS IN Q:	0
To Unix Errors:	5	BR CMD SENT FLAG :	0
From Unix Errors:	1	CRC:Overrun	206 : 0
Unix cmds Rcvd:	5541	TxUndrun:Abrt	0 : 73
Comh Cmds Rcvd:	90	Rec Tm:Xmit Tm	1 : 0
Cmdoverflowlnk.errcnt:	0	Reset Chip :	19
To Abc Xmittmouts:	0		
Abc Notreadycnt:	22358		
Ring Buffer err cnt:	0:0:0:		
Abcs:	10		
ABC Cmds Issued:	0		
-----			

In this window we are able to get the status of the Communication Handler.

Here **Abc Timeouts**: will give the no. which will increase when Communication Handler is timeout or unconnected to the COMH PC.

Otherwise instead of this window we can use PC ROUTER window in the ONLINE desktop.

>subw

Shows sub-array window containing information about number of antennae in sub-array, which source whole sub-array is tracking, with their target azimuth and elevation angles and many more.

DATE: 2005aug9

TIME: 17:15:46

LST: 13:54:14.8

PACKET: 3258367

SAC4 3258211

subac4.5: ABC SET TIME17:14:53,09-08-2005

subw

ProgID: 4

NoAnt: 30

State: TRKG

OUTTRK

Source: NGC4151

12h10m32.73 39d24'19.6"

Offs

How much deg or dec. offs

Target: Az: 137d49'05.2"

El: 59d52'37.5"

C00

C01

C02

C03

C04

C05

C06

C08

C09

C10

C11

C12

C13

C14

E02

0"

-80"

-17'

98"

48"

7'

3'

3'

-5'

2'

14"

-2'

-2d

54"

-2'

11'

-55"

6'

23"

9'

-85"

9'

7'

-10'

5'

14'

-3'

43"

-6'

-16"

m

m

m

m

m

E03

E04

E05

E06

W01

W02

W03

W04

W05

W06

S01

S02

S03

S04

S06

0"

9'

-84"

-6'

-3'

53"

18d

-137

-3'

-4'

2'

19"

4'

-11'

3'

22'

5'

5'

-15'

-8'

5'

10'

-60d

12'

-6'

28'

-85"

-9'

-14'

-9'

B

MBb

m

**ProgID**: Sub-array number. **NoAnt**: Number of antennae in the sub-array.

**State**: Gives the state of the antennae (TRKG or IDLE) & the track (OUTTRK or INNER).

**Source**: Gives source RA and DEC. **Offs**: When it is off from the source it shows how much deg or dec apart from the source.

Where each character under antenna name (e.g. m, B, MBb) is having its own meaning, which is given in section 2.2.

For example z means antenna is slewing, b means antenna applied elevation brakes etc.

>sacw

It is same as the sub-array window except there is difference in the naming that is we call this window as sub-array control window and the subw window shows MCM time-outs but sacw window doesn't show MCM time-out symbol.

-----																			
DATE: 2005aug9					TIME: 17:16:52					LST: 13:55:21.0					PACKET: 3258564				
SAC4 3258211					subac4.5: ABC SET TIME17:14:53,09-08-2005														
sacw																			
-----																			
-----																			
ProgID: 4 TRUE NoAnt: 30 State:TRKG OUTTRK																			
Source: NGC4151 12h10m32.73 39d24'19.6" Offs																			
Target: Az: 137d34'38.5" El: 59d42'06.2"																			
-----																			
C00	C01	C02	C03	C04	C05	C06	C08	C09	C10	C11	C12	C13	C14	E02					
25"	37"	29"	93"	64"	66"	41"	72"	51"	2'	85"	68"	2'	2'	-31"					
-16"	3"	-22"	31"	5"	4"	-25"	-13"	-11"	17"	12"	-15"	11"	26"	-8"					
E03	E04	E05	E06	W01	W02	W03	W04	W05	W06	S01	S02	S03	S04	S06					
-34"	-2'	-92"	-3'	30"	43"	37d	-137	-4'	-5'	2'	3'	5'	6'	9'					
36"	47"	68"	92"	8"	67"	75"	-60d	3'	4'	-98"	-2'	-3'	-4'	-6'					
					B					MBb									
-----																			

This command will gives the ABC status of selected antennae i.e. to see the ABC status of any antenna we have to first select it by `sela xxx` command here xxx refers to the antenna name in three characters otherwise it will show status of the previously selected antenna.

**time**: This is the current time of the Antenna base computer, which becomes idle when ABC is time out. When antenna gets reset then the time will show for how much time the antenna is in reset state, after this we have to initialise antenna.

**Mcms Active & Mcm Link**: Shows how many MCMs are active and there link status.

In the above figure ABC status of C00 antenna is shown. This will show if the antenna is time-out or it is communicating well. Also the MCMs configured with their link status is given. If MCM is time-out it shows 'T', in above window MCM 14 is showing time-out status.

>srvw

Shows the servo status for selected antenna. This window shows antenna's azimuth & elevation position, motor current, tacho of motors, servo mode (i.e. remote, manual, off or local), antenna's brake status, wind speed.

DATE: 2005aug9TIME: 17:47:12LST: 14:25:46.0PACKET: 3263968

SAC4 3263911subac4.5: LOAD NEW SRC SPECIFIC TRAK PARA

srvw

SERVO C00(07) servo time 017:47:03DIG STAT 2: 2: 2: 0: 6c:3:

AZIMUTH ELEVATION ELEV AZIM GEN

astro po +310:52:38 +055:38:24 D

encod po +130:52:38 +055:38:24 I run run

targe po +130:08:49 +058:57:45 G remo[auto],[loc]

poten po -002:55:00 +009:00:00 I acok

motor1 -20.17 4.30 T

motor2 -4.87 -9.02 A ssok

tacho1 -1328.20 1261.35 L posn

tacho2 -1371.18 -1223.87 [stwd] [trkg]

wind12 0.00 0.00 S [stps] slwg

T strl cwrp

A [brk1] [brk1]

T [brk2] [brk2]

The terms in the bracket are showing the possibilities of the status or flag which may come during the process of observation.

poten po : not in use nowadays, encod po : parameter to see the encoder position, astro po : shows astronomical coordinates of the source, targe po : shows the current encoder position of antenna. wind12 : wind speed at antenna by wind meters 1 & 2.

[stps] : (stow position) : elevation of antenna at 90d,

[stwd] : (stowed) : antenna stowed, strl : stow released, [brk1] & [brk2]: antenna applied brakes in respective axis, remo ,

[auto] , [loc]: in which mode antenna is. In servo off-mode no flag comes at the mode position & servo time stops, acok : servo

A.C. (alternating current) okay, ssok : servo station computer okay, posn or [trkg] : whether antenna is in tracking or

positioned mode, slwg : antenna is slewing, cwrp : cables are wrapped.



>srvs

Shows servo status like offsets, stowangle, wind limit, software lower limit, software higher limit .We are able to see the servo set parameters by giving rdsrvs in the user window by defining that particular antenna.

-----			
DATE: 2005aug9	TIME: 22:10: 7	LST: 18:49:24.2	PACKET: 3311380
USR4 3311061	user4.5:SERCMD	RDSE	
srvs			
-----			
SERVO A(07)	servo time 022:08:22	Date 9- 8-2005	
AZIMUTH	ELEVATION	Version 2.51	
states		Station C0	
offset	-000:28:59	+000:02:59	Selftest 30 30
stowang	+000:00:00	+090:00:00	
softlow	-265:00:00	+016:30:00	
softhigh	+264:00:00	+105:00:00	
G11	0.00	0.29	
T11	0.00	0.00	
T13	0.00	0.00	
G21	0.12	0.17	
T21	0.00	0.00	
T22	4.20	4.20	
T23	0.30	0.30	
windlimit	40.00	40.00	
-----			

The above figure shows the servo status of an antenna C00 but here the antenna name is not displayed only the antenna ID is shown i.e. 07 (Refer Appendix 14.1). Also it is showing the gains of Type I as well as Type II systems which are not for user, these parameters are for the engineers.

```
>losm OR losw
```

Use `losm` command when LO1 is greater than 600 MHz & `losw` when LO1 is less than 600 MHz .

The above command gives the information about which LO is set at what time also whether it is lock or unlock & many other parameters which are helpful for LO engineers. But for normal user which LO is set at what time & its lock or unlock status is important.

```
-----
|DATE: 2005aug10      TIME: 19: 5:11      LST: 15:47:54.3      PACKET: 100205
|USR0 100128      user0.5: SENDING QUED COMMANDS
|losm
|-----
|018:45:47      LOS MONITOR - ABC( 7)C00      STATE: 015
|                                     M=8 N=19
|VCO ON      :      YIG      MCM      : 3      Mode: AUTO      OLI      : LOCKED [UNLOCK]
|VCO Pow     : 09.3      dBm      Map      : Syn1-Ch1 Syn2-Ch2      ATTR      : 06 dB
|LO Freq     : 1040.00 MHz      Syn Step : 5 MHz      YIGDAC     : 33
|LO Pow      : 09.3      dBm      LOW Rack Temp:      LV-C      : 01.7 V
|ALI-CV      : 02.4 V      LOCK      SP4TS      : OK      HTRV      : 21.4 V
|POWER SUPPLY : Voltage :      Current      Voltage
|VCO YIG:(+18V:220) 238 :(150) 162 CONTROL:(+ 5V:240) 237
|VCO YIG:(-12V: 20) 021 :(110) 113 CONTROL:(- 6V: 20) 018
|LOPAM      :(+12V:240) 238 :(140) 130 MCM      :(+12V:240) 240
|MOTOROL:(+ 5V:240) 239 :(150) 130 MCM      :(-12V: 20) 019      Req Frq      Set Frq
|GIGABIT:(+ 5V:240) 240 :(160) 130 MCM      :(+ 5V:240) 240      -15078472 MHz      1040 MHz
|YIG      :(+ 5V:240) 237 :(150) 143 WALSH      :(+ 5V:240) 241      LAST UPDATE AT
|YIG      :(+15V:240) 233 :(150) 238 YIG      :(+ 9V:240) 231      018:45:47
|MESSAGE:      Error code 100      COMMAND EXEC ERR
|-----
```

**LO Freq** : Which LO1 is selected. **LOCKED** or **[UNLOCK]** : Whether it is lock or unlock. (Bracketed option is the possibilities of flags coming that flag on same location.)

**LAST UPDATE AT** : The time of LO1 setting.

```
>losr
```

It gives the LO system's raw status of various monitoring channels, this status is for the LO engineers. Normally telescope users do not use this window for LO monitoring. The detail information can get from `losm` and `losw` windows.

```
-----
|DATE: 2005aug10      TIME: 18:50:56      LST: 15:33:37.0      PACKET: 97708
|USR2 97696      user2.5: SELECT MCM MONITOR  1FOR MCM      2TYPE  0
|losr
|-----
|
|018:46:08      LOS MONITOR - ABC( 7)C00 - RAW MODE
|130 130 130 249 130 134 129 222      130 130 250 129 250 255 222 129
|130 130 130 250 130 134 129 132      130 130 251 129 128 253 129 129
|130 130 130 250 130 255 129 222
|231 131 130 130 252 255 215 128
|066 131 130 129 252 255 215 244
|233 142 130 130 130 255 236 127
|137 127 134 129 128 255 021 128
|236 140 130 130 128 250 240 129
|023 105 130 130 128 228 234 129
|130 128 128 130 128 166 021 129
|130 128 128 129 250 029 234 129
|130 130 250 129 128 255 132 129
|130 130 250 129 128 255 221 129
|130 130 250 129 250 234 132 129
|130 130 250 129 250 255 222 129
|-----
```

>lorm

It shows IF and LOR status for all antennae.

```
-----
|DATE: 2005aug10      TIME: 18:56:15      LST: 15:38:56.9      PACKET: 98663
|USR2 98641      user2.5: SELECT MCM MONITOR      1FOR MCM      3TYPE 0
|lorm
|-----
|
|              IF AND LOR STATUS ALL ANTENNA
|
|[ANC=>ABC NOT Config. MCM?=>ABC TIMEOUT/MCM NOT Config. X=>ERROR ]
|[OK=>Command exec OK (ATTN,BW,ALC set as Reqd.),ER=>Command exec ERROR]
|[N=>ALCFBV(Normal,Over,Under),M=>DETV(Exlow,Low,Medium,High,Vhigh) ]
|[F=>OLI+LI=>(1111=> 1st bit OLI,last 3 bits for 1,105 & 200MHz LI ]
|
|CEB      C03      C12      C04      C09      C02      C01      C00      W01      C11
|MCM?      MCM?      ER_XXX  MCMT      ER_XXX  ER_XXX  MCMT      ER_XXX  ER_XXX  MCMT
|              ER_XEX
|
|C14      C13      C10      W02      W03      W04      W05      E02      E03      C05
|ER_XXX  ER_XXX  ER_XXX  ER_XXX  ER_XXX  ER_XXX  ER_XXX  ER_XXX  ER_XXX  ER_XXX
|ER_XEX  ER_XEX  ER_XEX  ER_XEX  ER_XEX  ER_XEX  ER_XEX  ER_XEX  ER_XEX  ER_XEX
|
|-----
```

Normally users do not use this monitoring window.

>mcmw

It shows MCM window, shows different MCM channels output.

For example, consider antenna C00 is defined and we want to see its MCM status. By giving above command ondisp will show status of MCM 0 default with channel 0 onwards.

```

-----
|DATE: 2005aug15      TIME: 16:20: 9      LST: 13:22:08.0      PACKET: 1123716
|SAC4 1123383      subac4.5: ABC SET TIME16:18:17,15-08-2005
|mcmw
-----
|M(00)A(07)-00:01:02:03:04:05:06:07:08:09:10:11:12:13:14:15:16:17:18:19:20:21:
|016:19:35 e4:ff:e3:ab:ab:ab:ab:ab:aa:ab:81:--:--:--:--:--:--:--:--:--:--:--:
|016:19:37 e4:ff:e3:aa:ab:ab:ab:ab:ab:ab:81:--:--:--:--:--:--:--:--:--:--:--:
|016:19:39 e4:ff:e3:ab:ab:ab:ab:ab:ab:ab:81:--:--:--:--:--:--:--:--:--:--:--:
|016:19:42 e4:ff:e3:ab:ab:ab:ab:ab:ab:ab:81:--:--:--:--:--:--:--:--:--:--:--:
|016:19:44 e3:ff:e3:ab:ab:ab:ab:ab:ab:ab:81:--:--:--:--:--:--:--:--:--:--:--:
|016:19:48 e3:ff:e3:ab:ab:ab:ab:ab:ab:aa:81:--:--:--:--:--:--:--:--:--:--:--:
|016:19:51 e3:ff:e3:ab:aa:ab:ab:ab:ab:ab:81:--:--:--:--:--:--:--:--:--:--:--:
|016:19:53 e3:ff:e3:ab:aa:ab:ab:ab:ab:ab:81:--:--:--:--:--:--:--:--:--:--:--:
|016:19:55 e3:ff:e3:ab:ab:ab:ab:ab:ab:ab:81:--:--:--:--:--:--:--:--:--:--:--:
|016:19:58 e3:ff:e3:ab:ab:ab:ab:ab:ab:ab:81:--:--:--:--:--:--:--:--:--:--:--:
|016:20:00 e3:ff:e3:ab:ab:ab:ab:ab:aa:aa:81:--:--:--:--:--:--:--:--:--:--:--:
|016:20:02 e3:ff:e3:ab:ab:ab:ab:ab:ab:ab:81:--:--:--:--:--:--:--:--:--:--:--:
|016:20:04 e3:ff:e3:ab:aa:ab:ab:ab:aa:81:--:--:--:--:--:--:--:--:--:--:--:
|016:20:07 e3:ff:e3:ab:ab:ab:ab:ab:ab:81:--:--:--:--:--:--:--:--:--:--:--:
|016:20:09 e3:ff:e3:ab:ab:ab:ab:ab:ab:81:--:--:--:--:--:--:--:--:--:--:--:
-----

```

**M(00)A(07)** : Shows MCM status of 0<sup>th</sup> MCM for antenna 07 (i.e. antenna C00 refer Appendix) on channel 0 onwards.

If some body wants to select other MCM then there is command which is explained on next page.

```
>selm n
```

Selects MCM n i.e. if some body wants to see MCM 5 then give command `selm 5`.

```
-----  
DATE: 2005aug15      TIME: 16:38:41      LST: 13:40:43.1      PACKET: 1127044  
selm 5              MCM    5  
-----  
M(05)A(00)-00:01:02:03:04:05:06:07:08:09:10:11:12:13:14:15:16:17:18:19:20:21:  
016:19:35  
-----
```

If you want to see the channel-wise status of MCM then give a command `selc n`. It will enable to monitor all channels above the selected channel including same.

```
>selc n
```

Which will monitor all channel above this defined channels. For example we select channel 8. It will show all the channels above channel 8, including channel 8.

```
-----
|DATE: 2005aug15      TIME: 17:12:35      LST: 14:14:42.6      PACKET: 1133105
|SAC4 1132916      subac4.5: ABC SET TIME17:11:32,15-08-2005
|selc 8
|-----
|M(00)A(07)-08:09:10:11:12:13:14:15:16:17:18:19:20:21:22:23:24:25:26:27:28:29:
| 017:11:54 ab:81:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:
| 017:11:56 ab:81:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:
| 017:11:59 ab:81:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:
| 017:12:01 ab:81:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:
| 017:12:03 ab:81:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:
| 017:12:10 ab:81:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:
| 017:12:12 ab:81:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:
| 017:12:15 ab:81:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:
| 017:12:21 ab:81:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:
| 017:12:24 ab:81:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:
| 017:12:26 ab:81:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:
| 017:12:28 ab:81:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:
| 017:12:30 ab:81:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:
| 017:12:33 aa:81:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:
| 017:12:34 ab:81:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:--:
|-----
```

If the condition that you want to monitor only selected channels then give command `selc n chan1 ... chan n`.  
e.g. `selc 2 8 64` i.e. selected channels are 2 and the channels are 8<sup>th</sup> and 64<sup>th</sup>.

>iflo

Shows status of set IF parameters.

DATE: 2005aug15										TIME: 18:19:30		LST: 15:21:48.6		PACKET: 1145045	
USR0 1144876		user0.5:		SELECT MCM MONITOR				1FOR MCM		9TYPE 1					
iflo															
-----															
IF (Set)		CH1(Req)		(Set)CH2(Req)		LOR		LOCK & CV			POWER				
AGC_CV		:216 NORMAL		211 NORMAL		OLI		:218 LOCKED		97.5RM		: 165 NORMAL			
AGC_STS		:136 ON(OFF)		137 ON(OFF)		1MHzCV		:182 NORMAL		106RM		: 169 NORMAL			
DETV		:000 VLOW		000 VLOW		105_CV		:186 NORMAL		201RM		: 165 NORMAL			
PRE_ATTN		: 16 dB ( 16)		12 dB ( 16)		200_CV		:193 NORMAL		105VCXO		: 161 NORMAL			
POST_ATTN		: 14 dB ( 16)		10 dB ( 16)		1MHzLI		:150 LOCKED		105PAMP		: 158 NORMAL			
BANDWIDTH		: 32 MHz( 16)		ERROR( 16)		105_LI		:150 LOCKED		100VCXO		: 153 NORMAL			
ADDR_ENBL		OK				200_LI		:150 LOCKED		FRDOB		: 130 NORMAL			
SUPPLY		C41A	C41B	C42	C43	D41	D42	D43	D44	D45	200PAMP: 161 NORMAL				
+5V		--	--	OK	OK	--	OK	OK	--	OK					
-5V		--	--	--	--	--	OK	--	--	--	IF AND LOR STATUS				
+10V		--	--	--	--	--	OK	--	--	--	ABC( 7) C00				
+12V		OK	OK	OK	OK	OK	OK	OK	OK	OK					
-12V		--	--	ERR	ERR	OK	OK	OK	OK	OK	LAST UPDATE AT				
+18V		--	--	--	--	--	OK	--	--	--	018:18:40				
-18V		--	--	--	--	--	OK	--	--	--	COMMAND EXEC ERR				
-----															

The iflo shows monitoring of the IF and LOR system's parameters.

**PRE\_ATTN** : Set pre-attenuations for the respective channel. (like 16 dB for CH1 & 12 dB for CH2)

**POST\_ATTN** : Set post-attenuations for the respective channel.(like 14 dB for CH1 & 10 dB CH2)

**BANDWIDTH** : Set bandwidth here it is 32 MHz.

The required values are given under the **(Req)** column.

The rest flags are for the IFLO system engineers for monitoring PIU (Plug in unit), voltage, power counts.



```
>winw
```

Shows wind speed for all antennae.

```

-----
|DATE: 2005aug15      TIME: 18:41:50      LST: 15:44:12.3      PACKET: 1148970
|SAC4 1148323      subac4.5: ABC SET TIME18:38:07,15-08-2005
|winw
|-----
|
|              WIND MONITOR -- ALL ANTENNA STATUS (kmph)
|
|  [ANC=>Antenna NOT Configured.]  Wind >= 35 -    HIGHLIGHTED
|
|C03      C12      C04      C09      C02      C01      C00      W01      C11      C14
|0.00      0.00      0.00      0.00     11.00      0.00      0.00      0.00      0.00      0.00
|0.00      0.00      0.00      0.00      8.00      0.00      0.00      0.00      0.00      7.00
|
|C13      C10      W02      W03      W04      W05      E02      E03      C05      C06
|0.00     10.00      8.00      0.00      0.00      7.00      0.00      0.00     11.00      0.00
|0.00     10.00     16.00      0.00      0.00     10.00      0.00     14.00      0.00      0.00
|
|E04      E05      E06      C08      W06      S01      S02      S03      S04      S06
|0.00      6.00      5.00      0.00      0.00      0.00      0.00      0.00     13.00     12.00
|0.00     11.00     10.00      0.00      0.00      0.00      0.00      0.00     14.00     21.00
|-----

```

**S06** : Antenna.

**12.00** : Speed at wind meter 1.

**21.00** : Speed at wind meter 2.

>trkp

This is the tracking parameter window, which gives information about the longitude, latitude of the defined antenna. It shows the minimum & maximum software allowed angles for azimuth and elevation with a tracking state.

-----			
DATE: 2005aug15	TIME: 19:39:17	LST: 16:41:48.7	PACKET: 1159053
SAC4 1158451	subac4.5: ABC SET TIME19:35:51,15-08-2005		
sela c00	ABC	7	C00
-----			
TRKPARA C00(7)			
LAT:LONGITUDE	+019:06:00:-074:06:00	CDEC:SDEC	21284 :23895
AZERR:ELERR	+000:00:00:+000:00:00	SLSD:SLCD	250114461:222784523
AZMAX:AZMIN	+260:00:00:-260:00:00	CLSD:CLCD	722576676:643620923
ELMAX:ELMIN	+105:00:00:+020:00:00	INOUT:OVER90	OUTER : UNDER
STOWPOS:LONGCOR	+090:00:00:+000:00:00	DRA:DDEC	+000:00:00:+000:00:00
RA0:DEC0	+241:59:12:+048:18:27	DAZ:DEL	+000:00:00:+000:00:00
SINLT:COSLT	1046723 :3023966	TRD0:TAZEL	+000:00:00:+000:00:00
RAOFF:DECOFF	+000:00:00:+000:00:00	T0:LST0	011:30:26: 008:27:41
AZOFF:ELOFF	+000:00:00:+000:00:00	TMAX:STIME	000:00:00: 000:00:00
RA:DEC	+241:59:12:+048:18:27		
AZFLG	105147		
		TRACK STATE:	REM TRK
		TRACK STATUS:	0
-----			

Here the tracking state of the defined antenna is shown REM with its condition written in front of it i.e. TRK. If antenna is in OFF mode then Track State will be TRK OFF and also all the parameters will show 000:00:00 every where.

>msgw

Shows message window for the selected antenna. If the terminal is set to xterm then messages will come below the ondisp window. If the terminal is set to vt100 then messages will not come.

>tmpn

Shows temperature for all antennae at their base.

```

-----
|DATE: 2005aug15      TIME: 19:53:35      LST: 16:56:09.1      PACKET: 1161564
|SAC4 1161525      subac4.5:  LOAD NEW SRC SPECIFIC TRAK PARA
|tmpn
|-----
|
|          TEMPERATURE AND SMOKE MONITOR -- ALL ANTENNA STATUS
|
|  [ANC=>Antenna NOT Configured.  MCM?=>ABC TIMEOUT or MCM NOT Configured.]
|
|  C03      C12      C04      C09      C02      C01      C00      W01      C11      C14
|  23.46    18.66    23.89    22.59    23.17    22.73    22.88    22.59    20.70    20.70
|  OK       OK       OK       OK       OK       OK       OK       OK       OK       OK
|  C13      C10      W02      W03      W04      W05      E02      E03      C05      C06
|  MIDL     18.81    20.55    22.88    23.17    21.57    18.08    22.88    25.20    18.52
|           OK       OK       OK       OK       OK       OK       OK       OK       OK
|  E04      E05      E06      C08      W06      S01      S02      S03      S04      S06
|  21.28    21.13    22.59    20.99    19.10    20.70    18.08    19.68    20.99    18.08
|  OK       OK       OK       OK       OK       OK       OK       OK       OK       OK
|
|-----

```

**MIDL** : Antenna is not scanning temperature.

>ifbb

Shows LOs status for all antennae. This is not frequently used monitoring window.

```
-----
|DATE: 2005aug15      TIME: 20:49: 3      LST: 17:51:46.2      PACKET: 1170966
|SAC4 1169389      subac4.5:  LOAD NEW SRC SPECIFIC TRAK PARA
|ifbb
|-----
|
|              LOS STATUS ALL ANTENNA
|
| [ANC=>ABC NOT Config. MCM?=>ABC TIMEOUT/MCM NOT Config.      ]
| [OK=> (FREQ set as Req'd.),ER=>ERROR,LK =>LOCK                ]
|
|CEB      C03      C12      C04      C09      C02      C01      C00      W01      C11
|MCM ?    VCO ?    0355ER  ERRVCO  ERRVCO  MODERR  MODERR  MODERR  MODERR  MODERR
|MCM ?    YIG ?    YIG ?    0680ER  0680ER  MODERR  MODERR  MODERR  MODERR  MODERR
|C14      C13      C10      W02      W03      W04      W05      E02      E03      C05
|MODERR   MODERR   MODERR   MODERR   MODERR   MODERR   MODERR   MODERR   MODERR   MODERR
|MODERR   MODERR   MODERR   MODERR   MODERR   MODERR   MODERR   MODERR   MODERR   MODERR
|
|-----
```

>rffe

Shows front-end status for whole sub-array, like which RF box, noise, attenuations.

```
-----  
|DATE: 2005aug15      TIME: 21:11: 3      LST: 18:13:49.8      PACKET: 1174667  
|SAC4 1174510      subac4.5: ABC SET TIME21:10:06,15-08-2005  
|sels 4              SUBAC      4  
|-----
```

```
-----  
|Subarray 4          RF FRONTEND STATUS  
|  
|          RF STATUS          TURRET STATUS(Not imp)  
|  
|Request      Status  
|RFBox        0      0  
|Noise        Off    Off  
|Atten         0      0  
|PolSwitch     0      0  
|NoiseAtttn    0      0  
|  
|-----
```

>fpss

Shows FPS status like Fps packet no., current position, target angle, the status of feed, the command given to the feed.

```
-----
|DATE: 2005aug15      TIME: 21:38: 0      LST: 18:40:51.2      PACKET: 1179213
|SAC4 1179204      subac4.5:  LOAD NEW SRC SPECIFIC TRAK PARA
|fpss
|-----
|                                     FPSSTAT
|FPS          ABC      C00(7)                                     Error:          32
|Fps Packet no:      128787                                     CMDFAILCNT:      0
|Fps Version:        5.5                                       TIMEOUTCNT:      32
|CURNT POS:         -4.952                                     CHKSUMCNT:       0
|CURNT RPM:          0.00                                       RESETCNT:        3
|TARGET ANGLE:       0.000      **                             OVER CURNT:      0
|TRNGPT Angle:       0.000                                     MAXPWM:          0.000 %
|SLOPE:              0                                         MAX ANGLE:       0.000
|LRPM LMT/LRPM TMCNT 0.000      :0                             MIN ANGLE:      -15.956
|BRKCNT DIFF:        0                                         UA0 ANGLE:       0.000
|STP SLEW TMCNT:     0
|RMPUP TIME:         0
|FINE TUNE PWM:      0
|Status :            Feed Calibrated & Idle
|Cmd:                RD VERSION
|-----
```

Above window shows the feed status of C00 antenna.

```
>fpsr
```

This command also shows the feed status. The difference between the `fpss` and `fpsr` is that `fpss` shows the angle wise status and `fpsr` shows feed count wise status.

```

DATE: 2005aug15      TIME: 21:53:38      LST: 18:56:31.8      PACKET: 1181849
SAC4 1181268      subac4.5: ABC SET TIME21:50:10,15-08-2005
fpsr
-----
                                FPSRAW
FPS          ABC C00(7)                                Error:                                32
Fps Packet no:      129076                                CMDFAILCNT:                                0
Fps Version:        5.5                                TIMEOUTCNT:                                32
CURNT POS:          1357                                CHKSUMCNT:                                0
CURNT RPM:          0.00                                RESETCNT:                                  3
TARGET ANGLE:       1639 **                                OVER CURNT:                                0
TRNGPT Angle:       0.000                                MAXPWM:                                    0 H
SLOPE:              0                                MAX ANGLE:                                1639
LRPM LMT/LRPM TMCNT 0.000 :0                                MIN ANGLE:                                731
BRKCNT DIFF:        0                                UA0 COUNT:                                1639
STP SLEW TMCNT:     0
RMPUP TIME:         0
FINE TUNE PWM:      0
Status :            Feed Calibrated & Idle
Cmd:                RD VERSION

```

>mcml

For all antennae it shows the MCM 0,2,3,5,9 & 14 link status.

```
-----  
|DATE: 2005aug26      TIME:  3:37: 5      LST: 01:20:20.8      PACKET: 340509  
|SAC4 339153      subac4.5: ABC SET TIME03:29:24,26-08-2005  
|mcml  
-----  
-----
```

```
-----  
|                                     MCM LINK STATUS - MCM 0,2,3,5,9,14 resp.  
|                                     [ - => OK. T=>MCM TIMEOUT, B=> Busy, N=>MCM NOT Conf. A=>ABC Not conf]  
|  
|C03      C12      C04      C09      C02      C01      C00      W01      C11      C14  
|---      ---      ---      ---      ---      ---      ---      NNN      ---      ---  
|N--      N--      N--      N--      N--      N--      N--      NNN      N--      N--  
|  
|C13      C10      W02      W03      W04      W05      E02      E03      C05      C06  
|---      ---      ---      ---      ---      ---      ---      ---      ---      ---  
|N--      N--      N--      N--      N--      N--      N--      N--      N--      N--  
|  
|E04      E05      E06      C08      W06      S01      S02      S03      S04      S06  
|---      ---      ---      ---      ---      ---      ---      ---      ---      ---  
|N--      N--      N--      N--      N--      N--      N--      N--      N--      N--  
|  
-----
```

The upper row showing three '-' symbols, it mean that MCMs 0,2 & 3 are all right and the lower row shows MCM 5 is not configured and MCMs 9 & 14 are all right. Normally after setting RF, MCM 5 is turned off. Therefore here it is showing that MCM 5 is not configured.





>intr

All 30 antennas, Intruder alarm info through mcm 0.

>femo

Common box info if mcm 5 all channels in scan mode for all antennas.

>fest

Displays bytes for FE and CB mon for selected antenna.

>ants

Display antenna state(setting if rf,if,lo,bb) info if set these parameters in specific way to get the info

## 2.2 Details of ondisp subw Flags

The program ondisp displays the ONLINE status window. In this status window,the lowest line is a single character error indicator,

B	Azimuth brakes applied for antenna.
b	Elevation brakes applied for antenna.
I	Antenna in subarray is Idle and not in tracking mode.
M	Servo system of antenna is in 'Manual' mode.
R	Antenna got ABC reset.
z	Antenna in subarray is positioning to the source coordinates for azimuth and elevation axes.
K	Either antenna has not communicated since start of ONLINE or antenna(abc) is in kernal mode.
L	Servo system of antenna is in 'Local' mode.
s	Antenna stowed in elevation axis ( overrides b flag).
S	Antenna stowed in azimuth axis ( overrides B flag).
t/T	Servo computer/ABC is timing out(CEB time and unit time difference more than 20 sec).
m	MCM time out.
02IBb	Antenna got ABC reset.
02I	Antenna got ABC reset.
C	Motor current is high in Azimuth.
c	Motor current is high in elevation.
N	Antenna to configured for communicaton for COMH.
V	'acok' problem as indicated by antenna servo.
P	Azimuth axis in positioning (hold) mode.
p	Elevation axis in positioning (hold) mode.
E	Azimuth encoder fault (angle not bet -270 to 270).
e	elevation encoder fault (angle not between 0 and 110).

### 3 Communication-Handler (COMH)

For setting the communication of antennas with the COMH

We have to start ROUTER first on the BHASKAR machine.

Create a new desktop named as ROUTER on BHASKAR & in the **ROUTER desktop** give the following commands **in BHASKAR's terminal**

```
>ssh router@jupiter
```

```
password:***** [Refer to operator]
```

```
>rtrlinux &
```

Then a graphical window will come, in that  
Click the *record* file option and enter a filename,  
For example,

```
rtr_3jun.dat
```

In **MASTER window** in USER0 desktop,

```
>scctask command in MASTER.
```

Click *Start* on the ROUTER interface.

After starting the ROUTER go to **MASTER window** and type,

```
>stcomant
```

Suppose any problem comes in the Router then restart it, as given by above stated method.

*Other than this we can use the following commands for the COMH settings.*

Show antennas to which COMH talks.

```
>shcomant
```

Get COMH error statistics.

```
>shcomerr
```

Set COMH which antennas talks.

```
>stcomant
```

Software reset for COMH.

```
>rstcomh
```

Reset error counters of COMH.

```
>rstcoerr
```

Reset command respective counters.

```
>rstcr
```

## 4 Defining Subarray

Online has one MASTER control and other six SubArray Control (SAC) out of which Subarray 0 (SAC0) has got the same authority as MASTER control. With SAC0 and Master you can have all kind of control for antennae and the electronics in Central Electronic Building(CEB). Other than Telescope Operator (Observer) all user like ( engineers for testing system) may use the remaining Subarray controls. Viz.

SAC 1 (USER 1)

SAC 2 (USER 2)

SAC 3 (USER 3)

SAC 4 (USER 4)

SAC 5 (USER 5)

All user mentioned above are interface to corresponding SAC.

To insert required no. of antennas in any one of the subarray say sub-array4 the following commands can be given **in the USER0**.

**NOTE:-** *Before inserting antennae into subarray, please ensure that the scan is not running, if running then please stop that.*

Suppose 10 antennas(with antenna ID's 1 to 10) in suba 4 you want to add then give the following commands **in USER0 window**.

```
>ante 10 1 2 3 4 5 6 7 8 9 10
```

The first number followed by the ante is the number of antennae to be defined in subarray followed by that many ABC Ids.

```
>cp 0
```

cp variable can have only values 0, 1 and -1 before defining subarray.

Any other value will create error message.

cp=1 will add defined antennas to subarray.

cp=-1 will remove the defined antennas from subarray.

Define subarray

```
>suba 4
```

```
>defsub 4
```

We have to send the defined antennae to the respective subarray control.

```
>sndsacant
```

Then go to the respective subarray window & there also give the same commands as above **for subarray 4 go USER4.**

```
>ante 10 1 2 3 4 5 6 7 8 9 10
>cp 0
>defs 4
>suba 4
>sndsacant
```

Now all the defined antennae will come under the control of the USER4.

After subarray is defined whatever command you enter here, will go to the defined antennae.

Suppose in between observation any antenna shows any problem, to do the settings for only that antenna we have to define it separately in a subarray 0, you can define that antenna from **USER4** window for subarray 0.

For e.g. S06 applied brakes then **from USER4 window,**

```
>ante 1 30
>cp 0;defs 0;suba 0
>hold
```

Like this way we define it in the subarray 0 from USER 4. You can control single or any number of antennae by this.

Suppose at any time you want to see in which subarray you are working, by using the following command in the respective USER window.

```
>type suba
```

If this show "0" then to see the content of subarray "0" use command.

```
>shsub 0
```

It will give the ABC ID's of the antennae in the working subarray.

So this was all about the subarray defining.

## 5 Feed Rotation & their calibration

The MCM-5 controls the feed rotation. There are five feeds operating at frequencies of 150, 235, 327, 610 and 1420 MHz. The counts for positioning the different feeds on each antenna is different.

Suppose to rotate the feed for some selected antennae or all antennae, then first we have to define required antennae in working subarray. Add them in respective subarray, and give the commands.

For example if we want to move the feed at 1420MHz then give the following commands.

### Go to USER0

Load the FPS counts, for all antennae.

```
>run fpscnt
```

Initialise the FPS system.

```
>initfps
```

Move the feed to 1420MHz

```
>mvfps1420
```

Other than these commands to calibrated, preset, boot the FPS we have the following commands.

Set lower RPM limit. It will set default RPM limit for the defined antenna.

```
>stlrpmlmt
```

If somebody wants to set different lower R.P.M. limit then before this command he/she should define a limit by,

```
>cp(1)=XXX
```

```
>stlrpmlmt
```

Read lower rpm limit. It will read the lower RPM counts and show those in fpss or fpsr windows at LRPM count position for defined antennae.

```
>rdlrpmlmt
```

Set minimum angle.

```
>stminangle(XXX)
```

Read minimum angle

```
>rdminangle
```

Set maximum angle.

```
>stmaxangle(xxx)
```

Read maximum angle.

```
>rdmaxangle
```

Run to preset ; In bracket we have to give a count number at which we have to position the feed. (These counts are different for different feeds, refer Appendix.)

```
>runcpreset(xxxxx)
```

Run to preset angle. In bracket we have to give an angle at which we have to position the feed.

```
>rundprest(xxx)
```

Preset known position of feed in *count*.

```
>prstcfps(xxxxx)
```

Preset known position of feed in *angle*.

```
>prstafps(xxx)
```

Run to calibrate position.

```
>runcibr
```

Reboot FPS.

```
>fpsboot
```

Calibrate to UA0 angle. If CP=1 then it will calibrate in clock wise direction i.e. -10d side. CP=0 then it will calibrate in anticlock wise direction. This is not frequently used command, instead of this we can use runcibr.

```
>ua0cibr(x)
```



## 6 Running Correlator

First login to Correlator PC.

You can login in correlator PC for USB, LSB & BOTH, by giving commands which are written on the respective correlator windows on the left side of the colon sign.

For example :-

```
>ssh corracqa          for USB.
>ssh corracqb          for LSB.
>ssh corrctl           for BOTH.
```

Etc.....

Then login into mithunA:collect & mithunB:collect windows by same procedure.

For example :-

```
>ssh mithuna          for USB.
>ssh mithunb          for LSB.
```

If you are not able to login in mithunA or mithunB by this method then try the regular method of login with the login name “observer”.

To set BB bandwidth, go to USER0 and do baseband settings as per the instructions in Chapter 8 & edit “temp2/data/init.hdr.new” (change CLK\_SEL). The following table gives relation between the baseband bandwidth and clock selection.

BB Bandwidth (MHz).	Samp_freq, CLK_SEL
16	0
8	1
4	2
2	3
1	4
0.5	5

Then go to each correlator window, “mithunA:collect”, “mithunB:collect” and “bhaskar/aditya:dassrv” windows and give the commands written on the right side of the colon sign in each desktop with putting all processes in the background.

For example run “acq” following **in each desktop i.e. USB,LSB & BOTH:**

```
>acq & [In the window corracqa:acq for USB]
>acq & [ In the window corracqb:acq for LSB]
>acq & [ In the window correctl:acq for BOTH]
etc.....
```

The sequence of starting the correlator,

1)“acq”, 2)“acq 30”, 3)“sockcmd”, 4)“collect” in each desktop

After this start the “dassrv” by going into the **“bhaskar/aditya:dassrv” window.**

```
>dassrv &
```

Now go to the **BOTH desktop** and in the **windows “correctl:dlytrk” & “correctl:fstop/corrconfig”** give following commands

```
>newdlytrk in dlytrk window
>corr_config in fstop/corr_config window
>dlytrk --clk_sel 0 & in dlytrk window
>fstop & in fstop/corr_config window
```

For recording you have to go to the record **window of mithuna for USB & mithunb for LSB** and give the commands,

```
>record prjcode filename.lta X & for USB
>record prjcode filename.ltb X & for LSB
```

The term X is used for the integration time for recording the LTA. (which is equal to the integration time multiplied by 2 secs.)

Here you should mention the prj CODE ( In capital letters) for recording data for that particular Subarray. Note that Online maps all characters in UPPER case. These files are recorded in the mithuna & mithunb computers.

In **User0 window**

```
>allant (all antennas that likely to be added for session.)
>tpa(11)=15 3 for USB.
12 for LSB.
15 for BOTH.
>cmode 3 1 for USB.
2 for LSB.
3 for BOTH.
>initndas '/temp2/data/init.hdr.new'
>ante N n1 n2 n3 . . . . . nN where N is the no. of
antennae you want to take for observation
& n1,n2 ...nN are antenna Ids.
```

>suba X	X=1,2,3,4,5 the subarray taken for observation
>prjtit'title'	Title of the project upto 80 characters.
>prjobserv'NAME'	Name of observer upto 8 characters.
>initprj(15,'prjcode')	15 for BOTH. 3 for USB. 12 for LSB.

Then **go to the subarray X** and give following commands there,

>tpa RF RF LO1 LO1 LO4 LO4	
>prjfreq	Copy frequency parameters into ONLINE shared memory.
>lnknDasq	Setup the link between ONLINE and DAS.
>gts'sourcename'	Get source parameters.
>sndsacsrc(1,12h)	Track given source.

After reaching all antennae on the source start recording data by giving command.

>strndas

This command record the data on the source got by the last gts'sourcename' command.

Check the MATMON see the fringes are proper or not .

After getting required amount of data if you want to stop the recording give the following command in the suba X window.

>stpndas

If you want to start Sacfile or Command file, do the following.

>opsacfil 'command\_file\_name\_with\_full\_path'  
>strtsacfil

To stop the command file

>stpsacfil

To stop the project go to **USER0 window**.

>stpprj  
>hltndas

## 7 Settings for RF, LO & IF

There are two types of settings for the antennae

- 1.Single frequency.
- 2.Dual frequency.

### 7.1 Single frequency settings

For setting the RF, LO and IF parameters, the user needs to edit a file called setupnew.txt in the BHASKAR. The name of the file is aliased as the cdsetX where X=1,2,3,4,5.

Edit the file as per your requirement. The example of the setupnew.txt file is given at the end of this chapter.

Then send the control word to the antennae you need. A cdsetX (x=1, 2, 3, 4, 5 or m) is the general purpose aliasing done to ease editing of the proper parameter file (setupnew.txt) and run corresponding program which create the control word.

ONLINE has five different user control for general purpose named user1, user2, user3, user4 and user5. For example observer having control of user4 should use cdset4. It creates a control words for RF, LO, IF and BB in separate files which has to be sent to the antennas and baseband system using the following commands.

**NOTE:-** *Please check the RF-swap status before setting the front-end.*

One can check RF-swap on ADITYA by giving the command in home area,  
for example,  
`>more sw150`

Then edit the cdsetX file for the front-end.

After doing all the settings **go to the USER4 window**

```
>run set4rf
>run set4if
>run set4lo
```

**NOTE:-** *Nowadays new facility is added for IF settings i.e. the “NEW ALCs” for some antennae. Therefore for these antennae we have to edit file cdset6 which is containing*

*pre-attenuations and post-gains with a dollar sign as a prefix for post-gains.*

For run IF settings for all New ALC antennae then edit cdset6 file by giving command in the ADITYA's terminal as,

```
>cdset6 new
```

And give following command in the respective user window as,

```
>run set6if
```

If suppose somebody wants to set IF for one or more New ALC antenna/antennae then write the names of those New ALC antenna/antennae in front of the cdset6 in

ADITYA's terminal,

For example,

```
>cdset6 C01 C03
```

Then give same command in user window as,

```
>run set6if
```

## 7.2 Dual frequency settings

For setting dual frequency there is *cdsetd* file(We can edit it by giving *cdsetd* command in any BHASKAR's terminal.) which we can run after doing required settings, rest all procedure is same only we have to give two RF, IF, & LOs.

**NOTE:-** For more information on frequency & related parameters settings refer the next topic ***Frequency and related parameter setting.***

## 7.3 Example of a cdsetX file

```
*FRONT END PARAMETERS.
* select freq. of observation (50/150/235/325/610/1060/1170/1280/1390 Mhz.)
235

* select solar attenuator (0/14/30/44 dB. -1 for FE Termination.)
0

* select polarization unswapped(0) or swapped(1).
0

* select cal-noise level.(E-HI(0)/HI(1)/MED(2)/LO(3) (-1 for RF OFF).)
1

* LO PARAMETERS.
* select LO freq.(100 - 1600 MHz.)
308
308

* IF PARAMETERS. (Default is 14 14)
* select pre_attenuator and post_attenuator for CH1.(0,2,4,...,30 dB)
16
16
*select pre_attenuator and post_attenuator for CH2.(0,2,4,...,30 dB)16
```

```

16
* select IF band width for CH1 and CH2 resp.(6/16/32 MHz).
16
16

* select ALC OFF(0) or ON(1). for CH1 and CH2
0
0

* New parameters being added :
* enter NG in time domain (0,25,50 or 100) percent duty-cycle
0

* enter Walsh Enable(1) or Disable(0)
0

* Select the Walsh Group : Low Group(0) or Higher Group(1)
0

* BASEBAND PARAMETERS ( set_para[16] onwards ):
* Select the antenna group :
* [0  if all ant bb mentioned below  ]
* [1  if (C0 , C1 , C2 , C3 :130 MHz)]
* [2  if (C0 , C1 , C2 , C3 :175 MHz)]
* [3  if (C4 , C5 , C6 , C8 :130 MHz)]
* [4  if (C4 , C5 , C6 , C8 :175 MHz)]
* [5  if (C9 , C10, C11, C12 :130 MHz)]
* [6  if (C9 , C10, C11, C12 :175 MHz)]
* [7  if (C13, C14, SP1, SP2 :130 MHz)]
* [8  if (C13, C14, SP1, SP2 :175 MHz)]
* [13 if (W1 , W2 , W3 , W4 :130 MHz)]
* [10 if (W1 , W2 , W3 , W4 :175 MHz)]
* [11 if (W5 , W6 , E2 , E3 :130 MHz)]
* [12 if (W5 , W6 , E2 , E3 :175 MHz)]
0

* Select Base BANDWIDTH in KHz(16000/8000/4000/2000/1000/500/250/125/62)16000

* Select BB Gain (0/3/6/9/12/15/18/21/24)
0

* Select BB LO (Hz) Synth # 1 Freq.(MHz) (50.0 <= LO <= 90.0 / step 100 Hz)
70.0000

* Select BB LO (Hz) Synth # 2 Freq.(MHz) (50.0 <= LO <= 90.0 / step 100 Hz)
70.0000

* Select Map

*          Chan  # 1          Chan  # 2
* 1 -      Synth # 1          Synth # 1
* 2 -      Synth # 2          Synth # 2
* 3 -      Synth # 1          Synth # 2
* 4 -      Synth # 2          Synth # 1
3

BACK

```

## 7.4 Frequency and related parameter setting

### 7.4.1 Band Selection

GMRT Receiver system has got the five main band. The band selection can be either of the following.

150 MHz.  
235 MHz.  
325 MHz.  
610 MHz.  
1420 MHz.

The 1420 MHz band has got four sub-band out of which user can select individual band listed below or single band as a whole. The available sub bands available in it 1420 MHz are  
1060 MHz.  
1170 MHz.  
1280 MHz.  
1390 MHz.

### 7.4.2 Solar Attenuator

The solar attenuator available in GMRT front end are

0 dBm.  
14 dBm.  
30 dBm.  
44 dBm.  
Termination.

### 7.4.3 Polarization

User has to take care of the polarization switch to get fringes on antennas.  
polarization convention in each antenna is available here.  
The Polarization switch can be either of the following.

Unswapped.  
Swapped.

#### 7.4.4 Cal-Noise level

E-HI-Extra High cal noise

HI-High cal noise.

MED-Medium cal noise.

LO-Low cal noise.

Front End off

#### 7.4.5 LO Frequency

Two different polarization have two different LO frequency. Also there are two LO frequency synthesizers

*Synth-1* Sets LO frequency from 100 MHz to 600 MHz in steps on 1MHz.

*Synth-2* Sets LO frequency from 600 MHz to 1600 MHz in steps on 5MHz.

#### 7.4.6 IF Attenuation

IF attenuation vary from 0 dB to 60 dB in steps of 2 dB for each of the polarization. This attenuation is divided in two parts as Pre-Attenuation and Post-Attenuation. So Pre Attn. can have value 0 through 30 in steps of 2dB and same is true for Post Attn.

#### 7.4.7 IF band width

Possible bandwidth that can be set for each polarization are.

6MHZ

16MHZ

32MHZ.

#### 7.4.8 ALC status

ALC's can be put either ON or OFF independently on different polarization.

#### 7.4.9 Front End Parameter

NG duty cycle can be either.

0 percent duty-cycle.

25 percent duty-cycle.

50 percent duty-cycle.

100 percent duty-cycle.



Walsh status can be either of the following:

Enabled  
Disabled.

The walsh group can be either of the following:

Low Group.  
Higher Group.

Now new Baseband setting procedure is given, as per that it is not need to do the setting as per our setupnew.txt file, still for reference the baseband parameters are as follows.

### 7.4.10 Baseband Related Parameters

The **Baseband Bandwidth** can be set either of the following.

16000 KHz.  
8000 KHz.  
4000 KHz.  
2000 KHz.  
1000 KHz.  
500 KHz.  
250 KHz.  
125 KHz.  
62.5 KHz.

Corresponding **Baseband Gain** should be selected from following list.

0 dB.  
3 dB.  
6 dB.  
9 dB.  
12 dB.  
15 dB.  
18 dB.  
21 dB.  
24 dB.

#### **7.4.11 Baseband LO frequency( fourth LO) setting**

Base Band has got two LO synthesizers each of which can be set to individually any frequency from 50 MHz to 90 MHz in steps of 100 KHz. Then by selecting proper mapping desired BB LO (4 th LO) frequency can be set to both polarization.

## 8 Baseband settings

*General procedure for baseband settings is,*

- 1.Initialise the baseband server.(If done then no need).*
- 2.Set the baseband ALC ON or OFF.*
- 3.Set the baseband BANDWIDTH with GAIN.*
- 4.Set the baseband LO.*

**NOTE:-** *Please do the above settings in same order religiously.*

Steps 1 to 6 should be followed ONLY ONCE AFTER STARTING ONLINE, if 'bbserv' program window is not running on the BHASKAR.

- 1.Put Switch at PC mode,in the Reciever Room.
- 2.Check for program window of 'bbserver' program running on the baseband PC.
- 3.By default 'bbserver' runs after boot, if not running Click on the 'bbserver' icon on PC desktop and run it.
- 4.Run 'bbserv' in one of the ONLINE machine. If 'bbserver' is running on PC in Reciever Room, it will show following,

**Connected to the socket.**

**Got:Connected to BB**

**Got:CONNECTED TO BBPC**

**All the stale messages cleared msgid=1.**

- 5.The BaseBand command settings will get executed to the defined antennae in the subarray only. **Only USER 0/MASTER can control BaseBand.**

- 6.In USER 0 or MASTER window of ONLINE, type:

```
>run nbbproc
```

By this, following commands will become available to do the baseband settings through **USER0/MASTER.**

**Initialise the baseband server**

```
>initbbserve
```

**Set both Polarization and Sidebands: IPA=BW & JPA=Gain.**

```
>stbbwgnall(IPA,JPA)
```

Suppose anybody wants to set the bandwidth & gain separately then,

```
>stbbbandall(IPA)
```

```
>stbbndgain(JPA)
```

Set for the separate polarization=STRA2(130/175/both) as well as sideband=STRA3 (usb/lsb/both) with bandwidth=IPA and gain=JPA,

```
>stbblosyn('STRA2','STRA3',IPA,JPA)
```

**To set the baseband LO: STRA2=LO1,STRA3=LO2,**

```
>stbblo('STRA2','STRA3')
```

**Set baseband ALC:STRA2=130/175/both, STRA3=lsb/usb/both, IPA=0/1,**

```
>stbbalc('STRA2','STRA3',IPA)
```

**For example** The baseband settings to be done are

i)ALC—OFF for both sidebands & polarizations.

ii)Baseband LO—70MHz.

iii)Bandwidth & Gain—16000 & 0.

Then following commands should be given as follows in **USER 0/MASTER** , by defining the antennae to be include in the settings.

```
>stbbalc('both','both',0)
```

```
>stbblo('70','70')
```

```
>stbbwgnall(16000,0)
```

But before that you should have the knowledge of the **Baseband parameters.**

The baseband parameters are as follows:

**Baseband Related Parameters:**

The **Baseband Bandwidth** can be set either of the following.

16000 KHz.

8000 KHz.

4000 KHz.  
2000 KHz.  
1000 KHz.  
500 KHz.  
250 KHz.  
125 KHz.  
62.5 KHz.

Corresponding **Baseband Gain** should be selected from following list.

0 dB.  
3 dB.  
6 dB.  
9 dB.  
12 dB.  
15 dB.  
18 dB.  
21 dB.  
24 dB.

**Baseband LO frequency( fourth LO)** setting:

Base Band has got two LO synthesizers each of which can be set to individually any frequency from 50 MHz to 90 MHz in steps of 100 KHz. Then by selecting proper mapping desired BB LO (4 th LO) frequency can be set to both polarization.



The optional commands can also give which can be viewed by giving the command line argument as `-h`.

**For more help & more options use the options** `-h` for help

It will take help of a file for the IF attenuations, named as *antenna\_ifsetup.cur* in the same directory for power equalise. If you want to take other file for attenuations then there is option.

After entering all the required entries it will ask ,  
password: `>.astro1`

**In USER0** give the command as

```
>run setlev
```

Do the same atleast for three times.

It will create a file with modified IF attenuations named as *antenna\_ifsetup.cur*.

### 9.1.2 Power equalise through astro0.

```
Login as:      >pulsar@astro0
               >tcl
               >./antenna
```

Then a graphical interface named as “ANTENNA” will come,

**In the ANTENNA window**

Click on `Antenna Setup >>`

Select all using antennae and put already set IF attenuations.

Click on `Save`

Minimize this Antenna Setup >> window & keep it aside.

**In the ANTENNA window**

Click on `>Power Eq`

Select the band as well as the power levels at you want to equalise power with the options.

Then click a button `>Power Eq`

**Attention:** Wait for the clicked button to come out.

**In USER0** give the command as

```
>run setlev
```

Do the same atleast for three times.

## 9.2 Power Equalisation Using 30-to-1

```

Login as:                >elab@tcc-l1

Change working-directory to:  >/home/elab/powereq/

Run the program:           >./ofmpeq.pl

```

Ensure that the following options are supplied as proper arguments when program is run.

*The following command-line arguments are essential.*

```

Bandwidth:            -b  <IFBW> 6/16/32 Mhz

Side Band:            -B  <SideBand>  U/L for USB/LSB

Ants Used:            -U  <AntList>   '*' forall antennae

```

**Attention:** Option *-U* must be given with some antenna name(s) as argument. By default, no antenna is used.

The following command-line options may also be provided.

```

RF Frequency:         -R  <Freq> in Mhz

Source Name:         -S  <Source>

Unused Ants:         -F  <AntList>   'C00,E04,S03'

```

The AUTHIF attenuation files, for the respective frequency (the one provided with **-R** option), are read from the following area:

**/home/elab/powereq/ifsys/[freq].atn**



In case a non-standard IF attenuation file is to be used as input, it can be provided with option **-f**. *The format of this file should be the same as that of the standard AUTHIF attenuation file.*

**Attenuation File:**                      -f    <AttnFile>

The program will create a *runfile* for setting *RF* and *IF* settings. This *runfile* should be run in **ONLINE (USER0/USER4)**.

When program is run, it will get the fresh spectrum-dump from 30-to-1 switch. Depending on the attenuations, set, it will calculate what IF attenuations will bring the channel power to **-33 dBm**. Then, it will create a new *runfile* for new IF attenuation values. Again, this *runfile* is run to set the IF attenuations.

The program keeps on iterating, until the user gets the **reasonable power levels**, for all antennae.

## 10 How to do the POINTING

Pointing can be done in one of the two ways:

1. With Self power.
2. With Cross correlations.

*General procedure for pointing(both),*

- 1.Feed rotation.
- 2.Antennae on the Extended source.
- 3.Antenna settings.
- 4.Power equilisation (If Required).
- 5.Azimuth & Elevation scans on the source.
- 6.Analysis.
- 7.Loading pointing offsets.

*First make sure that all the feeds are properly focussed.*

### **Antenna Settings**

Antenna settings are done from *bhaskar* using program ***cdset4***. RF, LO, and IF settings are mentioned in *cdset4*, and then these settings are run from ***USER4***.

Following commands are used for this:

```
>run set4rf  
>run set4if  
>run set4lo
```

**Keep IF & BB ALC's OFF.** Do the default settings for the required frequency. Do the BB settings as per the Baseband settings document.

Then start Correlator(Refer Chapter 6 Running Correlator).

## 10.1 *Pointing with Self Power*

First go to any strong **extended** source.

by giving the following commnads

```
>suba 4
>gts 'sourcename'
```

Send antennae on that source

```
>sndsacsrc(1,12h)
```

Make all the pointing offsets for the required axis to be scan zero in the BHASKAR's terminal with the program 'mkzerooff' having the procedure of operation as follows,

### On BHASKAR's terminal

```
>mkzerooff [AZ/EL]
```

This program reads the input file `"/home/operator/runfil/NLDANTO.001"` and depending on the options it produces the output file `"/home/operator/runfil/ZERO_OFFSETS.001"`

1. If you run only "mkzerooff" with no options it will set the

both offsets (EL and AZ) to 0

2. If you run "mkzerooff AZ" then it will set azimuth offset to 0

without changing the elevation offsets.

3. If you run "mkzerooff EL" then it will set elevation offset to 0

without changing the azimuth offsets.

For loading these offsets in online,give it **IN USER0**.

```
>run zero_offset
```

**Do the power equilisation on the source if required.** (Refer section 9.1)

**Following things to be NOTE:**

Synchronize ONLINE PC time and Correlator PC time. While scanning rate should be 20'/1m or less.(It is beamshape dependent factor.)

Give the following command **IN USER4**.

```
>stabct          synchronization of time.
```

For Elevation Scan say,

```
>scanelsrc(20'/1m,18h30m)
```

Here **20'** is slewing rate of antennas per minute. and **18h30m** is the expected peak time. Depending upon User's requirement these parameters can be changed.

```
>strtndas
```

**NOTE** :- Remember while recording the data in MITHUNA & MITHUNB please don't use any integration time like '8m' or '4' etc. Because we want large records in less time.

For e.g. In mithunA record it like,

```
>record prjcode(in capitals) filename.lta &
```

Stop the scan after the time (2 times the time difference between the starting time & the peak time.).

```
>stpndas
```

Restore the position of the antennae on the source.

```
>gts'sourcename'
```

```
>sndsacsrc(1,12h)
```

For Azimuth Scan say same procedure as that of the elevation scan with change,

```
>scanazsrc(20'/1m,18h45m)
```

```
>strtndas
```

Then follow the same thing like elevation.

**Analysing data**

Log on **astro0**

Login as `>ssh backup@astro0`

Change the directory `>cd /d1/online/pointing`

Make current date directory `>mkdir ddm`

`>cd /d1/online/pointing/ddm`

Run programme *getoffsets* (programme written by Vasant Kulkarni).

Here following you have to give as input.

Lta file name with full path.

scan rate

scan number in Lta file

start time

stop time

expected peak time ( this should be correct)

**NOTE** :- *For start time, stop time & expected peak time please use the LTA time stamps.*

This programme will create PS files in the current area.

Then you have to update the offsets in Pointing Offsets file. For that go to any BHASKAR's terminal in that,

`>cd $RUNFIL`

Edit the file with added antenna offsets for both elevation & azimuth, carefully.

`>scsvi NLDANTO.001`

**10.2 With Cross Correlations**

For pointing with cross correlation values you need any **point source** like 3C48, 3c286, 3c147 etc.

Then put antennae which you are going to take as reference ( this should be reliable) in

separate subarray to track same source(Refer the defining subarray document).

Then make sure that **ALC's** at both **IF and BB are ON**. The BB ALC's you have to refer the **Baseband settings**.

Then start pointing for rest of the antennas.

Next procedure is same as above.

### **Analysis**

Only while analysing the data you have to run *vxget* (programme written by Vasant Kulkarni).

Rest all is same as above only the change is to include the name of the reference antenna as Ref.antenna.

Then load the pointing offsets same as above.

## 11 On Off deflection test for 30 to 1

Login as	<code>ssh elab@tcc</code>
Change directory	<code>cd /data/cspa/data/</code>
Create current date directory	<code>mkdir curntdate</code>
Change directory	<code>cd /data/cspa/data/curntdate</code>

*The order of doing test is*

1. On source 30 to 1 recording.
2. Off source 30 to 1 recording.
3. Measuring the deflection between On source & Off source.

Do all the settings for required antennae.

### 11.1 On source recording

Go to any strong source & in working sub-array's user make all antennae to track the source, while tracking the source record the 30-to-1 data by the following method.

Run the following program for recording with the command line arguments

```
>csprecord [option/s]
```

The following command line arguments are essential,

- m < SPA/VVM > Acquisition Mode
- d < number > No. of record for each antenna
- f < filename >

The other arguments are optional

- l < FirstLO >
- c < strt:stop:incr > Channels Selection (-Not Implemented )
- i < intg value > Integration (- Not Implemented )
- s < SwLoss Correction File> Without SwLoss Correction

Then give command for example as,

```
> csprecord -m SPA -d 3 -f sourcename_on.spd
```

After this wait till the 3 dumps over.

## 11.2 Off source recording

Go off source some degrees by giving command in the working user say USER4.

If the source has its own offsource coordinates then give command as

```
>gts 'offsourcename'
>sndsacssrc(1,12h)
```

**Otherwise** give commands as,

```
>gts 'sourcename'
>trkeloff(-10d)
>sndsacssrc(1,12h)
```

Wait till the antennae reach on the destination.

Record the data in the 30 to 1 in the as,

```
>csprecord -m SPA -d 3 -f sourcename_off.spd
```

Wait till the 3 dumps over.

## 11.3 Measuring the deflection between on & off source data

Run the program

```
>getdefl [options] onsrcfile offsrcfile
```

Here the option is

```
-b < IF bandwidth in MHz >
    (default is 6 MHz.)
```

It will create new files, one of them will be postscript & the other one will be text file.

In the postscript file the plots of onsource & offsource data with there deflections.

This was all about the deflection tests



## 12 How to start the observation

The order of starting the observation.

1. Edit the file */temp2/data/init.hdr.new* for proper CLK\_SEL.
2. Start acq, acq30, and sockcmd in LSB, USB, and BOTH.
3. Start collect program in LSB, USB.
4. Start the dassrv.
5. Start dlytrk with proper CLK\_SEL.
6. Start fstop.
7. Set the RF, LO, IF in *cdset5* as per the observer's requirement.
8. Set IF ALC's ON/OFF.
9. Run RF, LO, IF settings.
10. Run newauth for the observing frequency.
11. Run nauth.
12. Load antenna offsets (using *run nldanto*).
13. Set Baseband ALC's ON/OFF.
14. Set Baseband Bandwidth & Gain.
15. Set Baseband LO.
16. Give initndas.
17. Give initproject.
18. Give proper tpa.

a) Go to **BHASKAR's terminal** & to start the new header file with proper clock selection, edit the file by giving the command,  
`>vi /temp2/data/init.hdr.new`

b) To start the acquisition for USB & LSB as well as BOTH,

Go to **USB desktop** & in *corracqa:acq* window type  
`>acq &`

Go to **LSB desktop** & in *corracqb:acq* window type  
`>acq &`

Go to **BOTH desktop** & in *corrcrtl:acq* window type  
`>acq &`

c) To start the correlated acquisition for each as well as both bands

### **For USB**

Give following commands in USB desktop in respective windows

```
>acq30 & [in corracqa:acq30 window]
>sockcmd & [in corracqa:sockcmd window]
```

To collect the data into the mithuna

```
>collect & [in mithunA:collect window]
```

### **For LSB**

Give following commands in LSB desktop in respective windows

```
>acq30 & [in corracqb:acq30 window]
>sockcmd & [in corracqb:sockcmdwindow]
```

To collect the data into the mithunb

```
>collect & [in mithunB:collect window]
```

### **For BOTH**

Give the commands stated below in BOTH desktop in respective windows

```
>acq30 & [in corrcrtl:acq30 window]
>sockcmd & [in corrcrtl:sockcmd window]
```

In this desktop find 'corrcrtl:dlytrk' window , now we are going to type in that an optional command which is necessary but not each time at the beginning of the observation,if it is already given then do not give it again,

```
>newdly_config
```

This command will add new delays in the correlator to compensate the phase difference.

Now in the another window 'corrcrtl:fstop/corr\_config' window type

```
>corr_config
```

So that it will configure the correlator for the newly added delays

Again go to the 'corrcrtl:dlytrk' window and type

```
>dlytrk --clk_sel 0 &
```

**NOTE:-** Here we have taken the clock selection as 0, it is from the file  
'/temp2/data/init.hdr.new'

Then start the fstop i.e. stop the fringe by giving the command fstop in the  
'corrcrtl:fstop/corr\_config' window

```
>fstop &
```

This way we have started the correlated acquisition.

d) Now to start the DASSRV go to the ADITYA & in '**bhaskar/aditya:dassrv**' window

Change the directory

```
>cd /export/home/onsoft/01dec2002/dassrv-0.96
```

and give the command,

```
>dassrv &
```

e) **Go to the online USER 0**

Here we will start the init.hdr.new

```
>suba 0
```

```
>allant
```

```
>tpa(11)=15      [for both bands]
```

this tpa is optional i.e. For USB recording tpa(11)=3

For LSB recording tpa(11)=12

For BOTH sidebands recordings tpa(11)=15

```
>cmode 3      [for both bands]
```

this is also optional i.e. For USB recordings cmode=1

For LSB recordings cmode=2

For BOTH sidebands recordings cmode=3

then start the file i.e. [init.hdr.new](#) which we have already edited in section 2.a) by giving the command **in the USER0 window**,

```
>initndas '/temp2/data/init.hdr.new'
```

Here onwards we will start the project

```
>suba 4
```

```
>prjtit 'universe'
```

```
>prjobs 'GMRT'
```

```
>initprj (15, 'prjcode') 15 ==>BOTH
```

```
3 ==>USB
```

```
12 ==>LSB
```

f) Now the important part is to do the settings for required RF, LO & IF, which we usually do in special files in respective area which are accessible by the ONLINE, so that it will set the saved settings for all the required antennae by using some commands.

For that you have to edit the file for respective sub-array named as '*cdsetx*' where x is the sub-array number e.g. cdset4, cdset5, ....etc.

**NOTE :-** For dual observation the filename we use is '*cdsetd*' where d stands for dual.

These files are in the '*/export/home/operator/set/user/userx*' area on the BHASKAR where x stands for the sub-array number, as per our requirement of the sub-array we have to set the above settings for required sub-array.

Here as an example we will take sub-array 4 as our observational array in which we are going to do the observation, so go to any logged in terminal of BHASKAR and give command there as '*cdsetx*'. Edit the file and save the changes you have made.

Uptill these are the settings for the RF,IF,LO1 settings. Now we will do the settings for LO4 as per the baseband settings (Refer Chapter 8).

For LO1 we have to edit the file '*cdset5*' and after that give command '*set5l*' in the BHASKAR's terminal so that it will save the changes for the LO1.

g) To do the settings for edited files first go to the USER4

You have to type the tpa for the given settings of the RF with their LO values, for the two polarisations

```
>tpa RF1 RF2 LO1 LO2 LO4 LO4
>prjfreq
>lnkndasq
>suba 4
```

```
>run set4rf      [in general run setxrf]
                  [here x refers to the no. of cdsetx where we made
                  changes in the cdsetx file]
```

This command takes time for the settings so you have to wait for a minute, but during setting the symbol w will come per second like qwwwwws .

After successful command run give the command for setting IF.

```
>run set4f      [in general run setxif]
```

wait for the completion of the command successfully.

Now same as above we have to give the command for the LO1 in USER4 but here only the change to note is that we set previously the LO1 in cdset5 so here we will give command as run set5lo.

```
>run set4lo
```

h) For base-band settings and setting LO4 on BHASKAR in USER0 give commands as follows,

```
>allant
>cp 0;defs 0;suba 0
>run stbbalc('both','both',0)      [optional: if changed w.r.t. The previous
observation,                        otherwise not required]
>run stbbwgnall(16000,0)             [optional: if changed w.r.t. The previous
observation, otherwise not required]
>run stbblo('70.0','70.0')           [optional: if changed w.r.t. The previous
observation, otherwise not required]
```

i) To make AUTHIF settings in the BHASKAR's terminal give command

```
>newauth -h      [read help and choose options for required frequency]
```

Then go to the **USER0** and give the command,

```
>discmdmon
>run nauth
```

j) Give the following commands in the **USER0**

```
>discmdmon
```

Loading the antenna offsets,

```
>run nldanto
>enacmdmon
```

k) Here all the settings for starting the continuum observation are completed.

After this we have to record the data is recorded for two sidebands i.e. USB & LSB in MITHUNA and MITHUNB respectively.

By giving the command,

**For lta**

```
>record projectcode filename.lta c&
```

**For ltb**

```
>record projectcode filename.ltb c&
```

Here c means the integration time divided by two i.e. For e.g. if integration time is 16 seconds then the c will be of 8m here m is meridean filter only substituted for the 16 seconds integration, otherwise c is always like described above.

Like this way we start the observation. Depending on the conditions of the user the starting methods can differ from the method stated above. This is decided by the Scientific Assistance who operates the telescope.

l) Now the next job is to check that is observation going in the right way?

Therefore you have to check the following outputs,

i) Is MATMON giving the proper fringes,

[Question is how to see the MATMON:- Open the new terminal and login to MITHUNA for USB and then give the command

```
>ampmon -h [read the help and see the desired output]
```

Do same for the LSB MATMON by log in into the MITHUNB.

ii) Is 'dasw' window showing the tpa, obsname, obstitle, the starting status of DAS. (i.e. 0 for off & 1 for on)

iii) The MithunA & MithunB are recording or not.

iv) The gnuplots of USB & LSB for relevant frequencies and their related bandwidth.

- v) ADITYA message window for the current status is showing messages or not.
- vi) Check the ondisp window continuously so that you will come to know that is any antenna having problem or not.

.

.

.

.

.

.

.

.

etc.....

This was all about the starting the observation.

## 13 TroubleShooting

### 13.1 *MSEB Power fails for some or all antennae.*

First stop command file by (Usually in USER4 window)

```
>stpsacfil
```

Stop das scan by

```
>stpndas
```

Define all affected antennae in subarray ( usually all are in subarray 4).

```
>suba 4
```

```
>allant
```

```
>cp 0;defs 0;suba 0
```

Initialise all antennas by command initialize

```
>initabc
```

```
>gts'srcname'
```

```
>sndsacssrc(1,12h)
```

Set RF, LO , IF and BB parameters.

Load Pointing Offsets to all antennas.(In USER 0 window give following command)

```
>run nldanto
```

Then start command file.

```
>opsafil '/temp2/data/cmd/cmdfile'
```

```
>strtsacfil
```

### 13.2 *Antenna applies brakes in elevation*

Define that particular antennas in separate subarray give command in defined subarray's user say USER4,

```
>hldel
```

### 13.3 *Antenna applies brakes in azimuth*

Define that particular antennas in separate subarray say,

```
>hldaz
```

### 13.4 *Antenna applies brakes in both elevation and azimuth*

Define that particular antennas in saperate subarray and in same USER give,

```
>hold
```

### 13.5 *Antenna gives ABC time out*

If antenna gives continuous ABC time out, then raise the callsheet.

### **13.6    *Antenna got reset ( see Flags in ONDISP )***

Initialise ABC (Refer 13.1), by defining the antenna in any sub-array.  
Set RF,LO,IF parameters.

Pointing Offsets to be load for the particular antenna.

### **13.7    *If antenna goes in "I" mode***

First give the source by

```
>gts 'srcname'
```

Then say

```
>sndsacssrc(1,1h).
```

### **13.8    *If ONLINE disk gets full***

Move the big files in /home/onsoft/data to /temp2/data/online/ or /d1/online1/online/

### **13.9    *If servo doesn't go in "z" mode***

First give the source by

```
>gts 'srcname'.
```

say

```
>posn
```

After reaching near source say

```
>sndsacssrc(1,1h)
```

### **13.10    *Servo not releasing brakes***

Define that particular antenna in saperate subarray.

Say

```
>rstser                      for h/w reset of servo.
```

Or

```
>run srvrst                 for s/w reset of servo.
```

```
>hold                        for releasing brakes.
```

### **13.11    *Servo reads high current 204 or 203 Amps.***

Here no need of defining particular antenna in saperate subarray.

Go to USER1 window say

```
>run sft                    for s/w ABC reset.
```

then the sleep time for 10 seconds will come,in between that time,

Dial the no.=50+Antenna ID. (Refer Appendix 14.1)

Then antenna will reset.



Initialise ABC (Refer 13.1).

### ***13.12 All MCM's are giving time out except MCM 0.***

Define that particular antenna in saperate subarray.

```
give
>ana 00000x
>st32dig(0)
then give
>ana 0ffffx          for MCM s/w reset.
>st32dig(0)
```

### ***13.13 Das doesn't get initiated.***

This will happen for following possibilities.

- 1.If more than one 'dassrv' or 'sockcmd' are running.
- 2.Subarray get killed while data acquisition is going on.

Then kill dassrv and sockcmd.

Otherwise stop the scan if running **go to USER0.**

Define the subarray in which observation is going say subarray 4.

```
>suba 4
Stop the project.
>stpprj
Halt the das.
>hltndas
```

### ***13.14 Ist LO is not getting lock.***

Try to set Ist LO for another frequency and if sets then revert back to previous one.

### ***13.15 No fringes in antennas***

- 1.See whether baseband is set in proper order.

- i.Baseband **ALC's**
- ii.Baseband **BANDWIDTH & GAIN.**
- iii.Baseband **LO.**

check whether pointing offsets have been loaded ?

- 2.See whether fstop is crashed?

If yes then start it,also check the delay track is running if not please run it.

Stop the scan give the source by gts'srcname'.

Then 'strtndasc'

### ***13.16 No fringe on newly added antenna.***

See whether antenna is tracking source.

See whether all settings have been done ?

See whether pointing offsets has been loaded?

### **13.17    *Low amplitude.***

Incorrect Pointing offsets have been loaded ?

Correct it.

### **13.18    *Wind goes high.***

If wind goes higher than 45 kmph (Kilo meter per hour) then

Stop observation.

Park all antennas by following process

```
>suba 4  
>stpsactrk  
>mvel 90d
```

Wait for all antennas to go to 90d then say 'brake'.

## 14 Appendix

### 14.1 ABC IDs

Below all ID wise antennae and antennae wise IDs are given.

ID wise antennae		Antenna wise IDs	
01	C03	C00	07
02	C12	C01	06
03	C04	C02	05
04	C09	C03	01
05	C02	C04	03
06	C01	C05	19
07	C00	C06	20
08	W01	C08	24
09	C11	C09	04
10	C14	C10	12
11	C13	C11	09
12	C10	C12	02
13	W02	C13	11
14	W03	C14	10
15	W04	S01	26
16	W05	S02	27
17	E02	S03	28
18	E03	S04	29
19	C05	S06	30
20	C06	E02	17
21	E04	E03	18
22	E05	E04	21
23	E06	E05	22
24	C08	E06	23
25	W06	W01	08
26	S01	W02	13
27	S02	W03	14
28	S03	W04	15
29	S04	W05	16
30	S06	W06	25

## 14.2 Feed information

Following is the information about the feeds at various frequencies with their counts and degrees.

<b><i>Feed</i></b>	<b><i>610/235MHz</i></b>	<b><i>150MHz</i></b>	<b><i>1420MHz</i></b>	<b><i>325MHz</i></b>
Degrees	0	90	180	270
Counts	1200	6500	11500	16500