Initialization of the 4-m Telescope System

The common procedure, to be followed before any experiment with 4-m telescope, is given in
this document.

Introduction

The 4-m SRT can be used to perform various experiments such as finding the offsets of telescope coordinates, the beam-width of the telescope, detection of Galactic HI line etc. The detailed procedures for all experiments are provided in separate documents. Before actually performing any experiment, the telescope and receiver has to be initialized and the necessary procedure is described below.

PLEASE GO THROUGH THE PRECAUTIONS CAREFULLY BEFORE PERFORMING THE EXPERIMENT.

Initialization of the Telescope and Receiver

While performing the initialization, make yourself familiar with the different parts of the
system.

2.1 The 4-m SRT , The telescope consists of the following subsystems as shown in the block diagram below.
1. 4-m dish mounted on a Alt-AZ mount
2. 21-cm feed mounted on the dish
3. Receiver
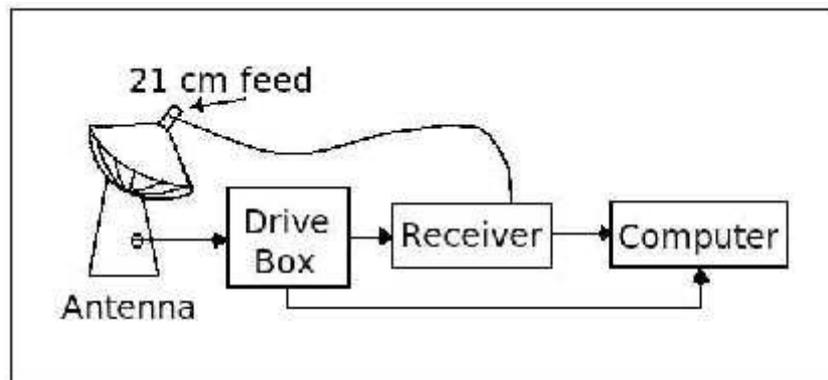
Figure 1: The block diagram of 4-m Telescope system.

4. Receiver and stepper motor Control PC
5. Encoder PC/104

Initialization of the telescope

Starting up

Press green buttons on 4m drive box, which start stepper motor driver and encoder PC 104.

Figure 2: 4m Drive box

Boot Receiver and stepper motor driver PC (RPC). Use account name – student, password is "student@rpl".

Open terminal window in Receiver PC and give following commands

>> sudo su

>> "student@rpl"

>> 4mstart

Above command will lounch Graphical User Interface window for 4m Radio Telscope as below.

PLEASE HANDLE THIS GUI CAREFULLY, DON'T ROTATE ANTENNA IN ANY RANDOM DIRECTION.
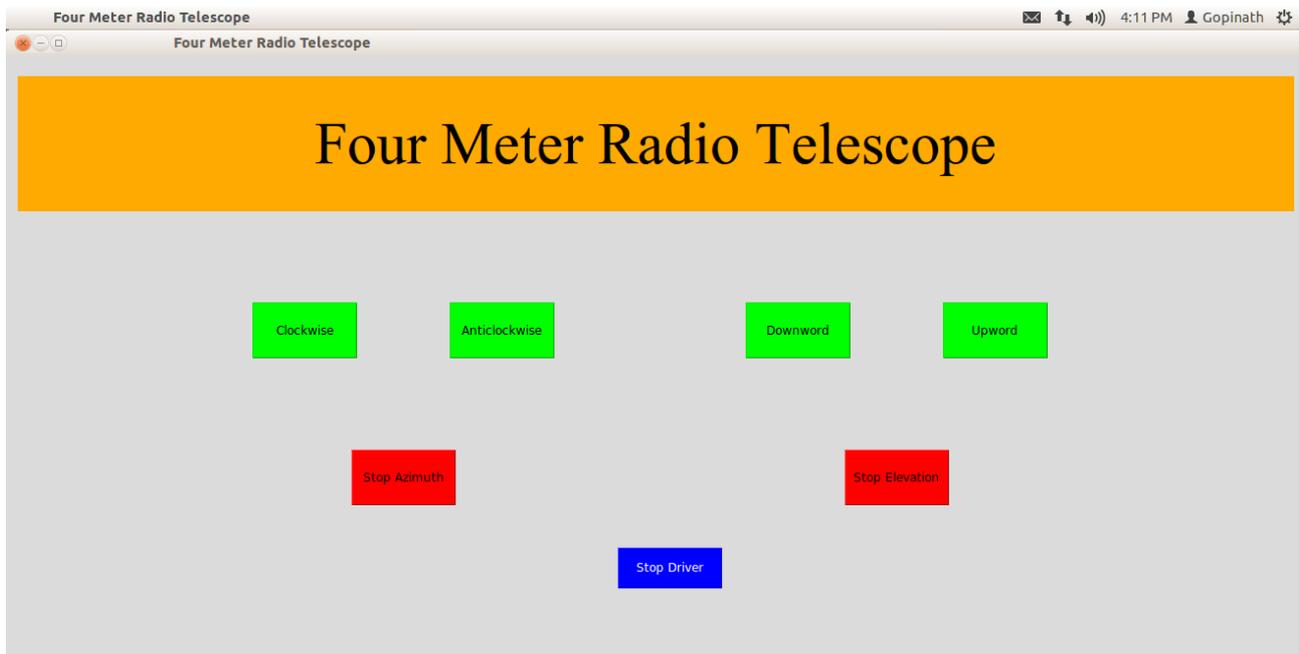
Figure 3: GUI to control 4m Antenna

Initialization of encoder:

Wait for 10 seconds for initialization of encoders.

Press "enter" twice on EPC.

1. Type "cd user\bin" in encoder PC (EPC).
2. Type "encoder"
3. Type the file name as "az_batch_no" or "el_batch_no" then press Enter.
4. Type the duration of obs as 0 and then press Enter.
5. Rotate the antenna in either azimuth or elevation. The reading of the encoder will be displayed on the screen and will change as the antenna rotates.
6. You may have to note this during the experiments. Follow the instructions given for the individual experiment.
7. To copy data from EPC, reboot system by pressing Alt+Ctrl+Delete and attached USB. Make sure that USB has been detected by PC104. If it is detected then,

>> cd user\bin
>> copy file_name d:\file_name

Above command will copy data file in USB. This File contain encoder data which you can use for further analysis.

Initialization of receiver

For Continuum mode

1. In Receiver PC, go to Desktop >> Spectracyber directory and exicute (double click) "SpectraCyber.exe".
2. Select continuum mode by clicking "SETTINGS - MODE – CONTINUUM"
3. Select IF bandwidth by clicking "SETTINGS - IF BW - 15 KHz"
4. Select integration time by clicking "SETTINGS - INT – CONTINUUM – 0.3"
5. Select online mode by clicking "OPTIONS - ONLINE" (This will open a settings window)
6. Select the settings for continuum mode as given below in the Table-1

Parameter	Value
IF Gain	20
DC Cont Gain	10
DC Cont offset	0.50
Time/step	0.40
Source name	'Sun-dd-mm-yyyy-batch_no'

Table 1: Receiver Settings for Continuum mode

For Spectral mode

1.In Receiver PC, go to Desktop >> Spectracyber directory and exicute (double click) "SpectraCyber.exe".
2. Select spectral mode by clicking "SETTINGS - MODE - SPECTRAL"
3. Select integration time by clicking "SETTINGS - INT - SPECTRAL – 1.0"
4. Select integration time by clicking "SETTINGS – IF BW KHZ - 15"
5. Select online mode by clicking "OPTIONS - ONLINE" (This will open a settings window)
6. Select the settings for spectral mode as given in Table 2
7. This completes initialization of the telescope and receiver.

Parameters	Value
IF Spec Gain	20
DC Spec Gain	10
DC Spec offset	1.61
Time/step	0.20
Upper Limit	2000
Lower Limit	-2000
Source Name	Name

Table 2: Receiver Settings for Spectral mode

Data acquisition

1. Select rescan OFF mode by clicking "SCAN - RESCAN OFF"
2. Start a scan by clicking "SCAN - START" (NOTE: WAIT FOR 10-15 sec. once you click on
"START" for the first time, it takes 10-15 sec. for the receiver to initiate).
3. Scan can be stopped by clicking "SCAN - STOP"
4. A scan can be saved by clicking "SCAN - SAVE SCAN". This will create a data file with start UTC time in the name. The first line (a header preceded by C) in the file lists the settings and the remaining lines list of values representing intensity. Two data points are separated by Time/step selected (in continuum mode) or are separated by the channel band width selected (in spectral mode), which is by default set to 15kHz through SETTINGS - Bandwidth". The values of parameters can be adjusted as required for different experiments.

Precautions

1. DO NOT rotate the antenna beyond the limit angles indicated by the limit switches. ASK the RPL supervisor about this and familiarize yourself with the limits.
2. In case you notice any malfunctioning of the antenna system, stop the experiment and
   call the RPL supervisor.
3. The receiver takes 10-15 sec. to initiate. Please wait for 10-15 sec. once you click on
   "START" scan before starting actual scans for the first time.
4. Make sure the telescope is parked in its parking position (140 deg Azimuth, 90deg Elevation) after the experiment is over.

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