

# Initialization and operation of the 3 – m Telescope systems

## 1 Introduction

The 3-m SRT can be used to perform various experiments, such as finding the offsets of telescope coordinate system, the beam-width of the telescope or detection of Galactic HI line. The detailed procedures for these experiments are provided in relevant documents. This document gives the procedure to initialize and operate the telescope and the receiver. These procedures are common to all experiments.

The 3-m telescope consists of a steerable paraboloid dish equipped with receivers operating at 1420 MHz. The telescope is steered using DC motor drives controlled by digital controller and a laptop. The receiver consists of a 1420 MHz horn feed, a low noise amplifier and a superheterodyne receiver, which is operating using a personal computer. The 3-m telescope is located on the roof of NCRA East Campus and the digital controller, receiver, laptop and personal computer in room No 8.

## 2 Initialization and settings of the Telescope and Receiver system

1. The telescope and the receiver control is located in RPL room no.8
2. The motion of the telescope is controlled by drive box. This in turn is operated through a Lap-top.
3. Connect the drive cable to the round connector at the back of drive box(digital controller).
4. Connect the laptop serial port to the serial port at the back of the drive box
5. Boot the laptop and login as “user” account. The password will be provided by the instructor.
6. One member of the batch should position himself near the antenna, while the others can help in setting up the electronics.
7. Power up the drive box by flicking the switch on the front side of the drive box. The antenna will start slowly moving towards north to home position (0 degree azimuth and 10 degree altitude). **PLEASE ENSURE THAT NO CABLES GET ENTANGLED DURING THE MOTION OF TELESCOPE AND THE TELESCOPE IS NOT FOULING WITH GROUND OR WALLS NEARBY. IF ANY OF THIS IS NOTICED, THE DRIVE BOX SHOULD IMMEDIATELY BE SWITCHED OFF AND THE INSTRUCTOR INFORMED.**
8. Left click on SRT ICON on the laptop. This will open a screen as shown below. Familiarize yourself with this screen. The top bar gives the list of available commands as buttons. Command parameters can be entered in the bottom-most row. The visible sky is shown in the middle panel. The panel on the left shows the current and target positions of the telescope and the current offsets. The date and time is also indicated alongwith the source being observed.

## 9. Familiarize yourself with the relevant commands on toolbar

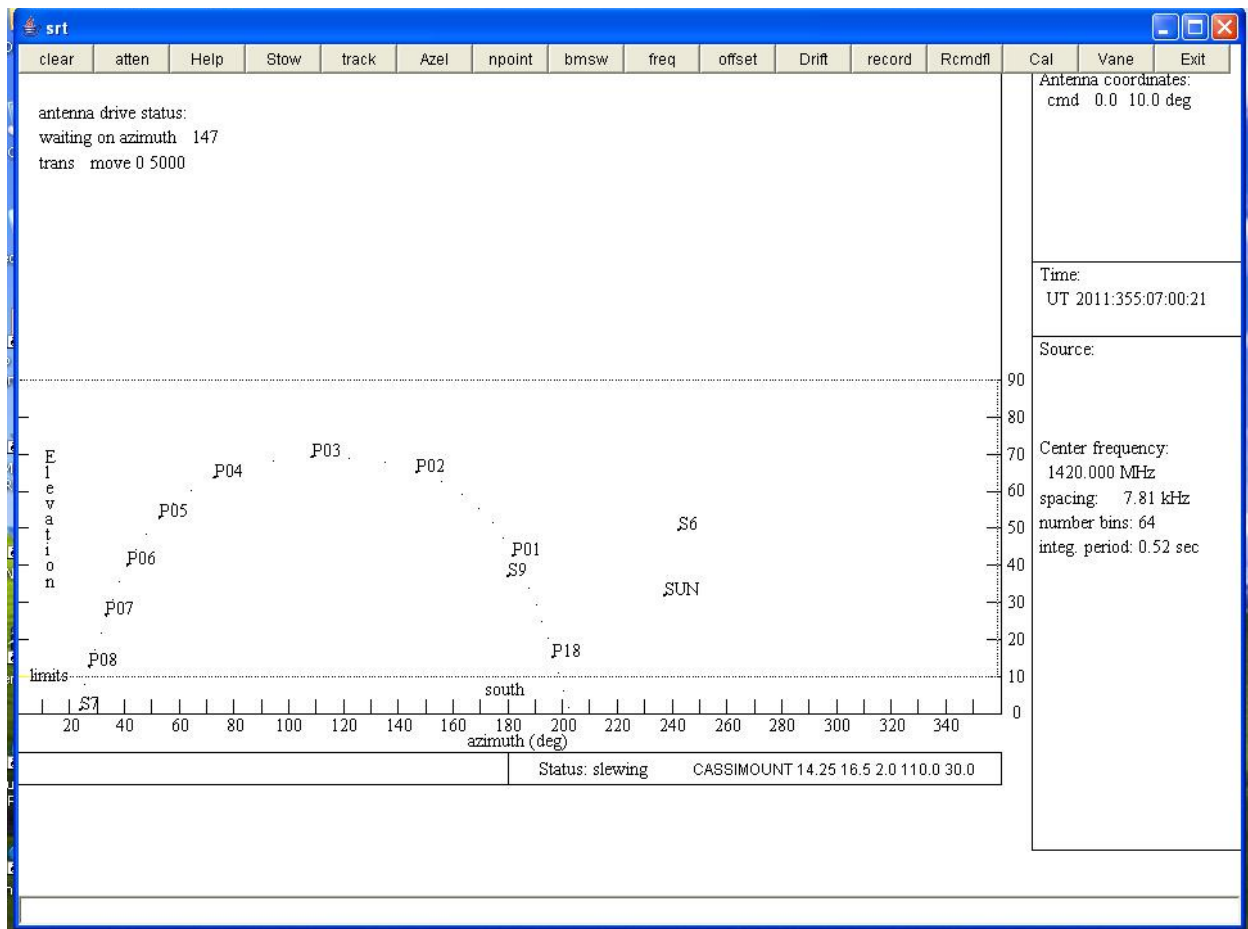


Fig 1 SRT screen

The most commonly used commands are listed below

- |      |  |                          |
|------|--|--------------------------|
| i)   | Stow – To go to home position of antenna   | <b>(StOW)</b>            |
| ii)  | Azel – To move to desired value of azimuth and elevation, which are typed in the row at the bottom | <b>(AZEL az el)</b>      |
| iii) | Offset – To change the offset value to antenna   | <b>(OFF azoff eloff)</b> |
| iv)  | Track – to track a source  | <b>(TR)</b>              |
| v)   | Exit – to exit from the program  | <b>(EX)</b>              |
| vi)  | A source can also be tracked by clicking on it   | <b>(CL)</b>              |

10. The radio signals are processed by a superheterodyne receiver. This is operated using a personal computer.

11. Connect the power cable and RF cable at the backup of the receiver. Connect the serial port at the backup of the receiver to the serial port of the personal computer
12. Switch on the power to the receiver
13. Boot the personal computer and log in as user (password will be provided by the instructor)
14. Click on “spectracyber” icon to start the receiver GUI, which is shown below

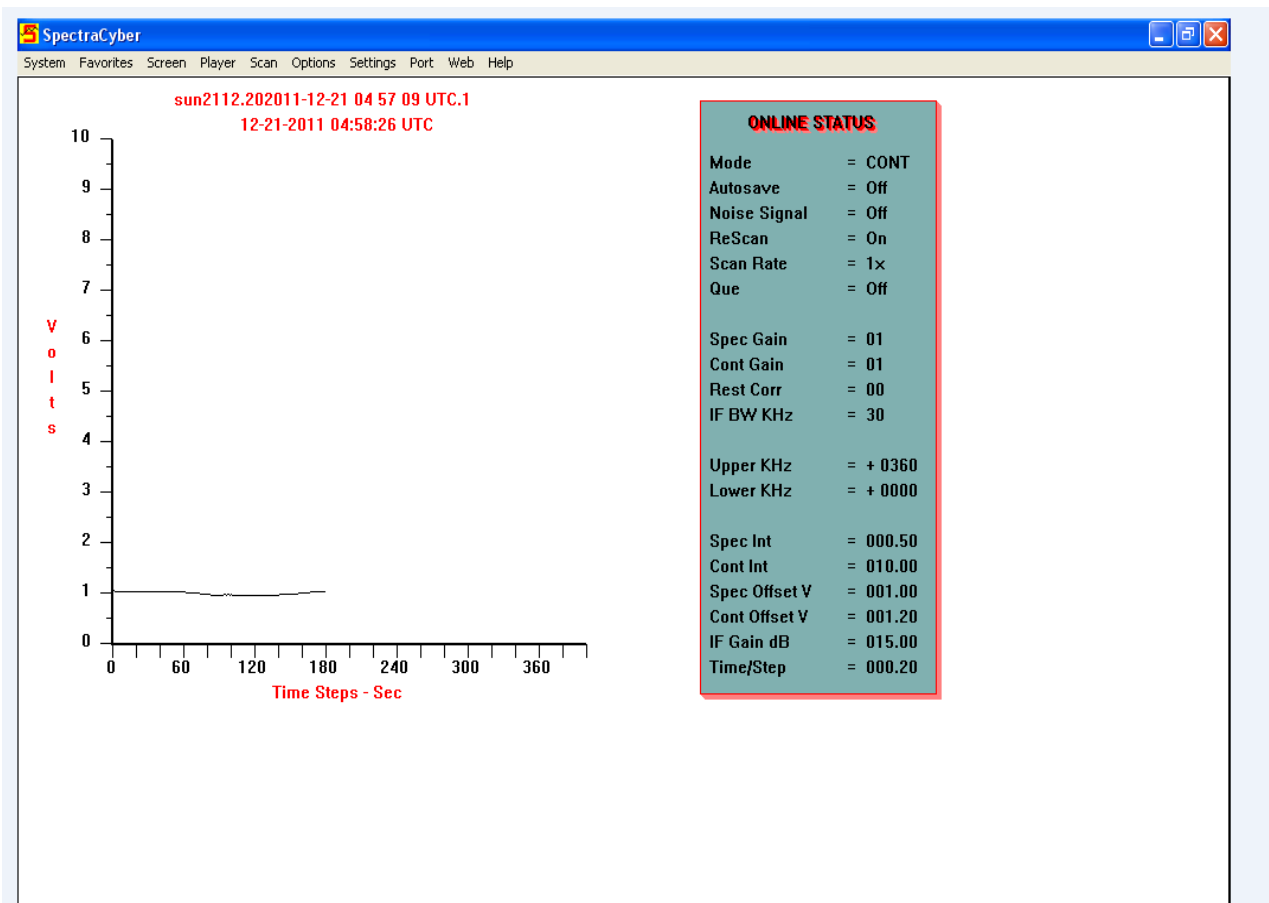


Fig 2 receiver screen

15. The receiver has two modes of operations. It is used in the “continuum” mode for the offset and solar experiments, where it acquires the total power from the band as a function of time. It is used in “spectral” mode in the HI experiment, where it acquires total power as a function of frequency around 1420.4 MHz . Familiarize yourself with the GUI. On the left, a plot of the received data is shown and the current settings are shown on the right. The top row has a number of command buttons to set and operate the receiver

16. The commonly used buttons are listed below

- i) Options – online - to make the receiver receive commands from PC **(ON)**
- ii) Settings – to configure the receiver. This has several sub-options
  - a. Mode - continuum/spectral **(SMC/SMR)**
  - b. Integration - time for which the data is averaged **(SI)**
  - c. Spectral Bandwidth - 15/30 KHz useful in spectral mode **(SB)**
  - d. Settings – to set the data file name, IF and DC gain, offset, frequency range for the sweep in spectral mode and time per step **(ST)**
- iii) Screen – to get a white screen
- iv) Scan – to acquire and archive data. It has some useful sub-options
  - a. Start - to start scan **(STRTS)**
  - b. Stop – to stop scan **(STPSC)**
  - c. Save – to save scan **(SVSC)**

17. Tables, such as those below, give settings required for each experiment and are given with the instruction of each experiment

Mode	Continuum
Integration	10
IF BW KHz	30KHz
Target Name	File name

Parameter	Values
IF Gain	12db
DC gain	1.5
DC offset	1/5
Time/step	0.2
Source Name	

18. The above steps complete the initialization of the telescope.

19. Follow the procedure for each experiment as described in the experiment instruction sheet. The MNEMONIC for the buttons used are indicated in brackets in 9 and 16

20. After the experiment, position the antenna to azimuth 0 deg and elevation 88 degrees.

21. Exit from both GUI and logout

22. Switch power off to drive box and receiver

## Precautions

1. While rotating the antenna, make sure that the cables do not get entangled.

2. On controller screen, command takes some 10 – 15 sec time to actually get initiated. Wait for 10 – 15 sec for after entering the command.
3. In case, if you notice any malfunctioning of the antenna system. Please switch off the power button of the drive box.
4. Make sure the telescope is parked in its parking position (at 88 degree elevation)