



# GBT Support Staff Policy Manual



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## **Changelog**

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## 1. Introduction

Support scientists are asked to work on a broad range of the observatory's operational activities; provide scientific and technical leadership within the observatory for new instrumentation, software, and algorithms; work closely with other divisions in developing, testing, and implementing complicated systems; provide round the clock support to our observers and technical staff; create user documentation; and promote the observatory's EPO activities. We are the primary interface with the observatory for astronomers, much like a customer support hot-line.

In a broad sense, the support group exists to promote the scientific productivity of the Green Bank Telescope. GBT Science Support staff play two crucial roles – Project “Friend” and “On-Duty” (on-call) support scientist. A Project Friend (or “Contact” Scientist) is assigned to each accepted proposal. The role of the Friend is to watch over the proposal throughout its entire life-cycle (from observations through data reduction, writing papers, and archiving data and data products). However, the Friend cannot be expected to be available when every one of their projects is scheduled on the telescope. Instead, when a project is scheduled on the telescope, support becomes the responsibility of the On-Duty Scientist. The On-Duty Scientist's primary responsibility is to provide real-time assistance as necessary during the observing process (e.g. assisting when a telescope fault occurs). In short, real-time observing support is carried out by the On-Duty person, while project preparation and post observing support is the responsibility of the Friend.

## 2. Time Devoted to GBT Support Work

Each individual in the GBT support group will be allocated a certain percentage of their time to support work and usually some percentage of their time to project work and scientific research. The percentages will differ from person to person and even from quarter to quarter throughout the year. Each person should record the time they spend on support, project work, and science in their weekly time report using the appropriate ETK codes. The majority of support staff are ‘exempt’, meaning we are not paid overtime. ‘Non-exempt’ staff are expected to avoid overtime unless permission is given by their supervisor.

All support staff members are asked to keep current on the “Absences” web pages the days they expect they will be away from work, either because of vacation, business trips, and doctor visits. The Absences web page is located at <https://staff.nrao.edu/wiki/bin/view/GB/AbsencesCalendar>.

## 3. Proposal Process

### 3.1. Call for Proposals

Calls for proposals occur twice a year. The February call is for proposals that will be scheduled during the B semester (Aug 1 – Jan 31). The August call is for the A semester (Feb 1 - Jul 31). Approximately one month before the call announcement notices will be sent out to astronomers via email and in the Green Bank Observer newsletter.

Support staff may be contacted by potential proposers asking for advice concerning their proposals. The support staff are expected to help potential proposers. The support staff should never suggest that they be added to the proposal – the proposers should extend the invitation if a staff member is to join a proposal. The support staff should be familiar with:

- Call for proposals
- Proposal process
- NRAO Proposal Submission Tool
- GBT Proposer's Guide
- GBT Sensitivity Calculator
- GBT Mapping Planner
- GBT RFI environment

### 3.2. Technical Reviews

After the close of each call, GBT support staff provide technical reviews of the submitted proposals. Each support staff member is expected to have enough general knowledge to be able to provide a technical review for any general proposal. Proposals that are more advanced or which require advanced expertise may be assigned to reviewers who are specialists in the field of concern. Staff are asked to indicate which scientific and technical areas they prefer to review, and their level of expertise, by updating <https://staff.nrao.edu/wiki/bin/view/GB/TechnicalReviewPreferences>

## 4. Project Contact Support Tasks

When you are assigned to be a contact person for a project, you will watch over the project until the project finishes the last step in its life cycle. Support scientists can familiarize themselves with the projects by referring to observing details of the proposals which are stored at `/home/groups/gbtscisupport`. A Project Check List of required support tasks is provided in Appendix A.

### 4.1. Pre-Observation Support

The first responsibility of the contact person is to initiate a conversation with the proposal's investigators a few weeks before the semester begins. The scope of the conversation depends upon the observer's prior GBT experiences and their experiences with other radio telescopes. For frequent GBT observers, the conversation might be just an email stating that you are the contact for their project and are available if they need any help in preparing for their observations. For new observers, the conversation will be more extensive and may require multiple emails, sometimes phone calls, and often support staff helping create observing scripts.

The Friend should coordinate any visits by observers. Observers should be informed to make reservations through the Green Bank Observatory Reservation System (GBORS). It is important to keep the GBT Scheduler informed about visiting astronomers, since they coordinate the receiver schedule. The Friend should inform Observers of the receiver schedule (and updates, <https://dss.gb.nrao.edu/receivers>) and work with the observers to schedule their visit when the desired receiver(s) are available. The Friend must inform the relevant On-Duty scientist(s) in advance of the visit, so that they are aware of the on-site observers and can plan accordingly. Before observing begins, the contact must be sure that the observer's scheduling blocks, catalogs, observing strategy, calibration and reduction plans are correct. It is the responsibility of the contact person to inform the on-duty support person of what might be required of them for projects with visiting on-site users.

## 4.2. Post-Observation Support

After the observations, the observing team may need assistance with the data processing and calibration. Depending on the complexity of the observations and the background of the user, significant effort from the project friend may be required post-observation. The primary software packages used to reduce GBT data are Dysh, GBTIDL, and PRESTO.

Support staff should suggest that observers fill out observers comment sheets, <https://dss.gb.nrao.edu/comments/> once a project is completed or closed. It is the contact's responsibility to respond to comments from the projects they are supporting.

About six months after the end of the project, the contact scientist should follow-up and ask about the status of the project. It offers an opportunity for observers to ask for our help without them initiating the conversation.

## 5. On-Duty Support Assignments

During observations, support becomes the responsibility of on-duty support person. The on-duty scientist should keep the contact scientist in loop to their interactions and communications with the observers. The On-Duty support scientist is expected to be On-Duty (on-call) for the full duration of their shift. The On-Duty person should try to be either in their office, or at their local/home residence – that is, somewhere that an observer or operator could call. It is the On-Duty person's responsibility to inform the operator whenever they will be unavailable for more than a half hour. The On-Duty support scientist is expected to respond to a phone call from the operator or an observer within a half hour and be at a location with sufficient internet capabilities to carry out a FASTX or VNC session to help diagnostic problems as needed. The On-Duty person should keep the operator informed if they will be available at a different phone number than the operator expects.

Whenever testing is required or whenever there is an on site observer, the On Duty support person must be available locally to come on site. The On-Duty support scientist should be available on-site to interact face-to-face with visiting astronomers as needed. The on-duty scientist may be requested to come into the control-room unexpectedly and should be able to respond and be on site within 1 hour. The on-duty person should be pro-active with regards to problems encountered during his or her shifts. This includes seeking out staff members who need to be informed of the problem or can help resolve a problem. The on-duty person should share their experiences and any workarounds with their fellow support staff either through emails or the weekly support meeting.

## 6. Interactions with Other Divisions

Support staff routinely work closely with the computing, electronics, engineering, operations, and software divisions and will interact with the business office.

### 6.1. Operations

Once observing starts, operators are the first line of communication between the observers and staff. Support staff provides a fair amount of the knowledge that operators need for debugging problems. Operators are invited to the weekly support meetings as a forum for operators and support staff to discuss what happens in the control room. All of us should make short visits

to the control room – once every day or two for those who are on duty, and once a week for the rest of us – for a friendly chat with the operator.

## **6.2. GBT Software Development, Electronics and Structural Engineering**

We are expected to work closely with software and hardware engineers for testing, debugging problems, and providing feedback on software and hardware subsystems. We are the interface between the GBT systems and the astronomy user community. The more you understand about our software and hardware systems, the better you are at supporting the GBT users and the mission of the Observatory.

## **6.3. Computing**

The Computing Division provides the computing resources that the observers and staff need. A few days before a new observer visits, the contact person should make sure the observer has a local account. The contact person should also make sure the observers are aware of our computer usage policy.

## **6.4. Business Office**

Some observers will come to Green Bank for observing and will be using our Residence Hall, cafeteria and our visitor's offices. Observers may ask us about how one signs up for a room, where to find our housing policies, the hours for the cafeteria, availability of local restaurants and shopping. Much of this information can be found at <https://greenbankobservatory.org/portal/visit/>.

# **7. Interactions with Observers**

Throughout the life-cycle of a project, support scientists must be respectful and professional in their interactions with users. Although we provide advice for the project, the observers should make the key decisions, and they are ultimately responsible for the success of the project.

# **8. Recurring Meetings**

There are a number of recurring meetings that support staff should attend.

## **8.1. Weekly Maintenance Coordination Meeting**

On Mondays at 9 AM, telescope operations coordinate all the requested activities for upcoming maintenance days, to schedule when maintenance will happen, and to schedule and coordinate our non-maintenance use of the telescope (e.g., our commissioning activities).

Anyone who has an activity for a maintenance day should add his or her request to the resource calendar by Friday. One of the goals of the weekly meetings is to negotiate the resolution of any conflicts with maintenance activities. When a test requiring telescope time is needed, a request should be sent to the GBT scheduler.

## **8.2. Weekly GBO Status Meeting**

On Monday after the weekly Maintenance Coordination Meeting all the support staff are expected to attend the weekly status meetings where project managers and division heads summarize events and activities for the last week and present plans for the following few weeks. This meeting provides a forum for interaction among all divisions in Green Bank.

## **8.3. Weekly Support Meeting**

We hold weekly meetings (10am Friday) where we will share the experiences from the previous week's observing. We will also use the meeting as a way to spread our expectations for the coming week, as a forum for the contact and the on-duty support person to talk about upcoming projects. Operations will send a representative to the meetings so that we can get an operator's perspective. We will also cover observing techniques or the developments of telescope's subsystems during this meeting.

## **8.4. Science Staff Meeting**

We hold regular bi-monthly meetings for all the GBT scientists, which include those who do not formally carry out GBT support duties. In these meetings updates are given in many different areas that are of interest to the scientists.

## **8.5. Science Lunch and Coffee, Colloquia, Journal Club and Workshops**

To better support our users and to understand the research being done on the GBT, all scientific staff are expected to attend colloquia, science lunch, and workshops. A basic requirement of the job is to be a participant in the GBO science community.

## **8.6. Single Dish School**

The GBO hosts a Single Dish School every other year. The goals of the school are to educate mostly graduate students in the techniques of single-dish radio astronomy. Support staff will be asked to provide lectures or mentoring to the students. One should see the school as a unique, highly effective outreach opportunity that promotes radio astronomy and the science performed by the GBT.

## **8.7. "GBT Remote Observing Training Workshops"**

The GBO hosts Remote Observing Training Workshops twice a year. The goals of the workshop are to give enough experience to attendees that they are ready to observe remotely with minimal support from the On Duty person. Support staff will be asked to provide lectures and/or mentoring to the students.

# **9. Observatory EPO Activities**

The science division participation in supporting EPO activities on site is expected and is a required part of the job. These activities include SETI Tour Lecture, Governor's School mentor, Science Fair, Open House, GBT tours for visitors.

## 10. Mailinglists

There are a number of mailinglists that support staff will need to subscribe to (gbtinfo, gbsci), or send messages to (e.g., gbipg). To subscribe to a mailinglist, visit <https://listmgr.nrao.edu/mailman/listinfo>.

### 10.1. gbtinfo

To be used for general topics and announcements only (e.g., maintenance will be... We have released version such and such....). The audience is rather extensive and includes most of the technical local staff plus many others from other sites, including various levels of management. The mailinglist is also used to inform staff of problems or workarounds that need to be widely advertised. Reports on receiver checkouts are also sent to this mailinglist.

### 10.2. gbsci

The gbsci mailinglist has as its main audience the Green Bank astronomers. Feel free to use this mailinglist to inform our astronomers of any topic you feel is worthy of their attention.

### 10.3. gbttops

The gbttops mailinglist has the limited audience of the GBT operators. Support staff members traditionally are not members. Use this mailinglist for messages that are dedicated to the operations group.

### 10.4. gbemploy

GBO-wide scientific staff. Observatory wide announcements of interest to the scientific staff are sent to this mailinglist.

### 10.5. Guidelines as to when to use a mailinglist, when not to

Mailinglists should not be used for flames or for promoting ones opinions. All mailinglists can have members that you might never realize. Sometimes what one might deem as news could be construed as criticism of a group or of a piece of hardware or software. If there is any doubt as to how your email will be interpreted, use direct emails to the staff members you wish to contact. Such emails can be promoted to the mailinglist if the recipients and you agree that a wider audience is needed.

## 11. Operator Logs

Support staff should try to develop the habit of reading daily or weekly the operator's logs. Logs can be read at <https://dss.gb.nrao.edu/ops/search>. It is helpful to read the logs to understand issues or how to help circumvent potential problems.

## 12. GBO Slack Channels

There are several NRAO Slack channels dedicated to GBT operations and the science division. These include gbt-oncall, gbt-troubleshooting, gbscience, and gbsci-sddev. As with e-mail, slack discussions should be respectful and professional.

## 13. Helpdesks

The NRAO user help desk (<https://help.nrao.edu/>) is for the users of NRAO facilities. It is used for general user inquiries, proposal questions, observing inquiries, and for data reduction. As a GBT support staff member, you have a staff helpdesk account (<https://help.nrao.edu/agent/>) where you can respond to tickets and answer questions from our users. You may be assigned helpdesk tickets in your area of expertise. The GBO computing division maintains a separate helpdesk system (<https://helpdesk.nrao.edu/>). This helpdesk system is used at Green Bank to request new computer accounts or report computer issues.

The contents of reports to the help desk should follow the same principles that govern mailinglists. Reports should be factual, as detailed as possible, uncritical, and free of personal opinions.

### A. List of Support Duties and Expected Level of Support

Depending on the experience of the observers and the type of experiments being carried out, the level of support can vary significantly. We broadly classify observers based on their experience as follows:

- If the project has Remote Observer(s), and this is a continuation of an existing project, or the Remote Observer(s) are known to be familiar with this type of observation, they are considered Expert. An Expert is expected to execute all phases of their proposal with only minimal interaction needed with the Support Staff.
- If the project has Remote Observer(s), but they are carrying out observations in a new mode, with a new instrument, or it is unclear if they are expert users, they are considered Experienced.
- If the project has no Remote Observer(s), the Observers are considered Novice. The Friend will inquire whether they are new observers, and if so inform them they should visit Green Bank or be trained remotely to carry out their observations. Novice users will require extra attention and interactions with the support staff.
- If the project is carrying out a new mode of observation and/or using new equipment that has not been fully commissioned (e.g., shared-risk), then the level of support required for many of the tasks will need to be determined on a case-by-case basis (“Special-Mode” in Table 1).

#### A.1. Summary of Support Scientist Observer Support Duties

Table 1 provides only an initial estimate to the level of the expected support on various tasks. Based on their interactions with the users, the contact and on-duty support scientists should use their best judgment on the level of support that is actually needed for each project.

Table 1: Project Check List

Number	What	Who?	Special- Mode	Expert	Experienced	Novice
P1	Initial Contact	Friend	S	S	F	F
P2	Observing Strategy	Friend	S	N	S	F
P3	Calibration Strategy	Friend	S	N	S	F
P4	Reduction Strategy	Friend	S	N	S	F
P5	Source Catalogs	Friend	N	N	S	F
P6	Configuration Scripts	Friend	S	N	S	F
P7	Observing Scripts	Friend	S	N	S	F
P8	Calibration Scripts	Friend	S	N	S	F
P9	Reduction Scripts	Friend	S	N	S	F
P10	Travel Assistance	Friend	S	S	S	F
P11	DSS Project Observers	Friend	S	S	F	F
P12	DSS Sessions Enabled	Friend	S	S	F	F
P13	DSS Blackout Dates	Friend	S	S	F	F
P14	DSS Special Parameters	Friend	S	S	F	F
P15	Pre-Observing Training	On-Duty/Friend	N	N	S	F
P16	Real-Time Support	On-Duty	S	S	F	F
P17	Qualifying Observers	On-Duty/Friend	N	N	N	F
P18	Post Observing Support	Friend	S	S	F	F

F: Full support required

N: Normally no support required

S: Some support required

## A.2. Project Checklist

This list provides a brief summary of the duties required at each stage of a project, roughly in the order in which they are normally executed. In the following sections, the support scientist should judge the level of support needed by “special mode” on a case by case basis, although Table 1 gives a rough indication.

### P1 - Initial Contact

At least two weeks before the start of each observing semester, Friends are expected to log in to the Dynamic Scheduling System (DSS) and determine which projects have been assigned to them. The Friend will then contact each Observing Group and provide them with initial guidance. Friends should use email and phone if necessary, and be pro-active in making the initial contact. The Friend duties at this stage are as follows:

- All Users: Read the project disposition letter, to see whether there are any specific constraints which have been placed on the proposal (e.g. only allowed to observe specific sources). Remind the Principal Investigator (PI) to ensure that their sessions, including windowed and fixed sessions, are correct. (The disposition letter can be found on the DSS project page.)
- Expert: Remind the PI to specify the DSS Project Observers (P11 – see later sections), enable the DSS sessions (P12), set DSS black-out dates (P13) and set any DSS special parameters (P14). Provide them with the standard documentation links, and volunteer to provide assistance as necessary. Inquire whether the Observer(s) plan to visit Green Bank, or observe remotely.
- Experienced: Provide the Observer(s) with the standard documentation links, and work with them on all aspects of the Project Checklist. Ask if they plan to visit, or plan to carry out their program remotely. If the Observer(s) do not plan to visit, the Friend may need to be proactive on following up on enabling DSS sessions (P12) and setting black-out dates (P13).
- Novice: The Friend should inform the Observer(s) that they should come to Green Bank for their observations or carry out remote observer training. The Friend should provide the Observers with the standard documentation links. Before a visit, work through all sections of the Project Checklist. Some aspects may need to be worked-out face to face or via zoom sessions, but it is most effective to have a general idea of the observing scripts before the observer(s) visit or before carrying out zoom GBT training sessions.

### P2 - Observing Strategy

The Observer will have to plan how to execute their observations. This will include whether these are pointed or mapping observations, what switching scheme to employ, and so on. The Observer will be required to determine the integration times required to reach the desired signal-to-noise; how to break this integration time up into individual observations; in the case of mapping observations, what map parameters to use; and so on. Low frequency Observers need to be cognizant of the RFI environment. High frequency Observers need to be aware of the weather constraints. These types of issues are covered by planning the general Observing Strategy.

- An expert user should be capable of planning their observing strategy unassisted.
- An experienced user should be expected to understand all of the concepts involved, but might need assistance e.g. in selecting some appropriate parameter values.
- A novice user may need to be educated in the concepts themselves, as well as how to choose appropriate strategies.

### **P3 - Calibration Strategy**

This topic covers everything necessary to ensure the Observer has well-calibrated data. In some simple cases (generally at low frequency) it may be simple enough to routinely perform point and focus observations, and periodically observe a standard calibrator. At high frequencies, the Observer may need to perform “Out-Of-Focus” Holography (via the AutoOOF procedure); the 4mm receiver, Argus, and Mustang require specific calibration observations. These types of issues are covered by the Calibration Strategy.

- An expert user should be capable of planning their calibration strategy unassisted.
- An experienced user should be expected to understand all of the concepts involved, but may need to be informed of receiver-specific calibration approaches, if they have not used that particular receiver in advance.
- A novice user will need to be guided through all aspects of calibration.

### **P4 - Reduction Strategy**

This topic covers everything necessary to allow the Observer to reduce their data. In simple cases, where precise calibration is not a major concern, it may be enough to run the data through the GBT spectral or mapping pipelines. MUSTANG and the CCB have their own analysis paths; the 4mm receiver and Argus have some added complexity, and some types of observation (for example, polarization observations) have complex data reduction requirements. Current GBT real-time data displays are quite limited, so it is important that the Observer becomes conversant with the appropriate data reduction steps before their observations, so that they can analyze their data in near real time. These types of issues are covered by the Data Reduction Strategy.

- An expert user should be capable of reducing their data unassisted.
- An experienced user should be expected to understand all of the concepts involved, but may need to be brought up to speed on the latest versions of software, and any new developments since their previous visit.
- A novice user will need to be guided through all aspects of data reduction.

### **P5 - Source Catalogs**

GBT source catalogs are powerful, flexible, and are fairly well documented. Most observers should be able to set up their source catalogs unaided, but support should be provided as needed.

## P6 - Configuration Scripts

Configuration scripts are subsets of the observing scripts which deal with the configuration of the Receiver / IF / LO / Backend chain. They take the form of a character string with simple keyword = value pairs. Many keywords are quite generic (e.g. velocity frame, velocity definition), but many are GBT and/or device specific.

- An expert user should be capable of defining their configuration scripts unaided
- An experienced user will be familiar with the general concepts, but may need to be assisted in setting keyword/value pairs for new instruments.
- A novice user will need to be guided through every step of the configuration process.

## P7 - Observing Astrid Scripts

Observing scripts deal with those aspects of the observing process which involve commanding the antenna to move, and the backends to acquire data. Astrid has a number of scan types such as OnOff, RaLongMap, Track, and NOD which may be used to build up observations. Since Astrid includes a python interpreter, all the power of python (such as for loops, if blocks) may be used to build up sophisticated observing scripts.

- An expert user should be capable of defining their observing scripts unaided.
- An experienced user will be familiar with astrid, and the general concept of observing scripts, but may need to be assisted in setting up a script appropriate to this particular observation.
- A novice user will need to be guided through every aspect of setting up observing scripts.

## P8 - Calibration Astrid Scripts

As well as their science data, for properly calibrated results Observers will need to perform a variety of calibration observations. These will include pointing and focus checks, observations of standard calibrators, and so on. Some observing schemes will have rather more complex calibration requirements (“AutoOOF” observations for high frequency observing and “spider scans” for polarization measurements).

- An expert user should be aware of the necessary calibration steps and how to command these through Astrid.
- An expert user will need to be informed of any receiver or observing mode dependent calibration strategies, and how to execute these through Astrid.
- A novice user will need to be guided through every aspect of creating calibration scripts.

## P9 - Reduction Scripts

As noted, simple GBT observations may be processed by the appropriate data reduction pipeline. More complex observations will require custom analysis through GBTIDL, or through the other analysis packages (e.g. the MUSTANG data analysis pipeline, PRESTO, and so on). In most cases, it will be most effective to automate various aspects of the data reduction process by writing data reduction scripts.

- An expert user will be expected to be conversant with all aspects of creating data reduction scripts.
- An experienced user will need assistance in customizing data reduction scripts to their particular observing configuration.
- A novice user will require assistance through all aspects of creating data reduction scripts.

### **P10 - Travel Plans to Green Bank**

Onsite observers get a “boost” in the DSS scheduling algorithm, so there is an incentive for all observers to visit. It is important to keep the GBT Scheduler informed about visiting astronomers, given that they make up the receiver schedule. The Friend should work with the observers to schedule their visit when the desired receiver(s) are available. It is preferable, if possible, to schedule their visit when the Friend is also the On-Duty Scientist to minimize unnecessary handoffs. If this is not possible, the Friend should inform the relevant On-Duty Scientist in advance of the visit, so that they are aware the Observers are on-site. The Friend should arrange to have a computing account created for the Observer before their visit; the Observer will then pick up the account information sheet from the Friend or OnDuty Support Scientist.

- Expert users should be familiar with relevant travel procedures.
- Experienced users should simply be reminded of the procedures via the provision of appropriate web links.
- Novice users will need assistance in making travel plans to the Observatory.

### **P11 - DSS Project Observers**

The DSS system requires that each observing project designate one or more Project Observers. The mechanism to do this is quite straightforward.

- For expert and experienced users, the Support Scientist should simply check that Project Observers have been designated.
- For novice users, the Support Scientist should provide links to the relevant documentation, and then ensure Project Observers have been designated.

### **P12 - DSS Sessions Enabled**

Observing sessions must be enabled in the DSS before they will be eligible to be scheduled. This is a straightforward process.

- For all observers, the Support Scientist should ensure that the project has enabled sessions.

### **P13 - Black-out Dates**

The DSS allows Project Observers to specify black-out dates; dates when they will not be available to observe. The process for specifying black-out dates is straightforward.

- For all observers, the Support Scientist should remind the project team to set their black-out dates appropriately.

## **P14 - DSS Special Parameters**

The DSS has some “special parameters” which may be used to fine-tune the likelihood of a project being scheduled. For example, the DSS support team can enter a session-specific factors that effectively elevates the score for a particular session in marginal conditions. PIs must make a request to the GBT scheduler to have DSS special parameters set.

- Expert users will be aware of the DSS special parameters, and may request them to be set appropriately.
- Experienced and Novice users may not be aware of the DSS special parameters; the Support Scientist should alert the Observer to the possibility of using them if it seems appropriate for their project.

## **P15 - Pre-Observing Training**

While the Observer is on-site, but prior to their actual observing time, the On-Duty Scientist should provide Novice Observers with observing training. This might be provided by a shared VNC session and/or zoom training sessions, but face-to-face is preferred when possible. During this time, the On-Duty Scientist can demonstrate Astrid in “monitor only mode, to explain the User Interface and Status Displays. They can also “play back” existing observations from a similar project, to demonstrate the Real-Time Display, including the processing of pointing, focus and AutoOOF observations. The On-Duty Scientist should also ensure the Novice Observer has enough familiarity with the appropriate data reduction tools so that they can monitor the quality of their observations in real time.

## **P16 - Real-Time Support**

Ideally everything will have been prepared in advance, and the main responsibility during the observing process will be to assist the Observer and Telescope Operator in the case of any issues. At this stage, support will be provided by the current On-Duty Scientist, rather than the Friend. Duties expected of the On-Duty Scientist at this stage are as follows:

- Expert: The On-Duty Scientist will check in with the Telescope Operator on a daily basis, and that should be enough to gather any feedback provided by an expert user.
- Experienced: The On-Duty Scientist should check in with any on-site observer(s) to confirm that the Observer is prepared and ready for observations, and ask if they need any assistance.
- Novice: The On-Duty Scientist should check in with any on-site observer(s), as with experience observers, and also be present in the Control Room at the start of observing to assist with any problems. To assist remote novice observers, the on-duty scientist should log in and support the beginning of a session via talk&draw and/or using a zoom room. After the session is confirmed to be running successfully, the on-duty scientist can step away and be on regular on-call support. New observers will need to be added to the Astrid observing list by the operator.

In all cases, the On-Duty Scientist is expected to assist with any problems which might occur during the observing process.

## **P17 - Qualifying Observers**

After a Novice Observer has observed for one or two sessions, the On-Duty Scientist can recommend to the GBT Scheduler that the Observer is qualified for Remote Observing. This implies the On-Duty Scientist believes that the observer has a good grasp of the observing process and can continue unassisted. As part of this process, the On-Duty Scientist or the Project Friend should ensure that the observer has the appropriate remote observing software (FastX or VNC) installed and configured correctly.

## **P18 - Post-Observing Duties**

The Support Scientist's duties continue even after the end of observing. Observers may need assistance with data processing and calibration. Duties expected of the Support Scientist at this stage are as follows:

- Expert Users: Request that they fill in an Observer Comments sheet. Be prepared to answer questions on data analysis, calibration, etc, although these are only likely to occur if there were problems during the observing run. After six months, contact the Principal Investigator, and inquire about the status of the project.
- Experienced Users: As for Expert Users, with the possibility that more assistance may be requested.
- Novice Users: As for Experienced Users, with the possibility that more assistance may be requested.