

45m telescope COSMOS (observing program) manual

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For quick start, please mainly read the sections of “[1. Introduction](#)”, the first half of “[3.1 User interface window](#)”, and “[4. Quick look & Scan monitor](#)”.

This manual is available from the 45m web page: <http://www.nro.nao.ac.jp/~nro45mrt/>

1. Introduction

COSMOS is an observation control program of the 45 m radio telescope.※) It was written and is maintained by software engineers of the Fujitsu Company and by us. Observers should know basic ways how to use it to operate the telescope. This is a simple manual of COSMOS.

At the corner of the control building (2nd floor) of the 45 m telescope, there is a main console. In addition, there are an antenna console and other terminals (see a photo in the next page). The functions of these terminals are as follows:

- [Main console](#)
Observers put most of commands (click buttons) from this terminal. Basic information on the status of the telescope is displayed.
- [Antenna console monitor](#)
Observers can change the operation mode of the telescope (antenna). The console was made on a display of Macintosh.
- [Quick look & Scan monitor](#)
Observed raw spectra are immediately shown here ([quick look](#)). In case of pointing observations, pointing results are also shown here, and observers put correction values of the pointing from this terminal. This monitor also displays observing points and movement of the telescope schematically ([scan monitor](#)).
- [Frequency setting monitor](#)
Frequency diagram from frontend to backend is shown here. Observers can check frequencies of the local oscillators, coverage of the filters, IF power levels, and so on.
- [Automatic log display](#)
Observing log is automatically generated and displayed here. Observers can write their comments and search for old logs.

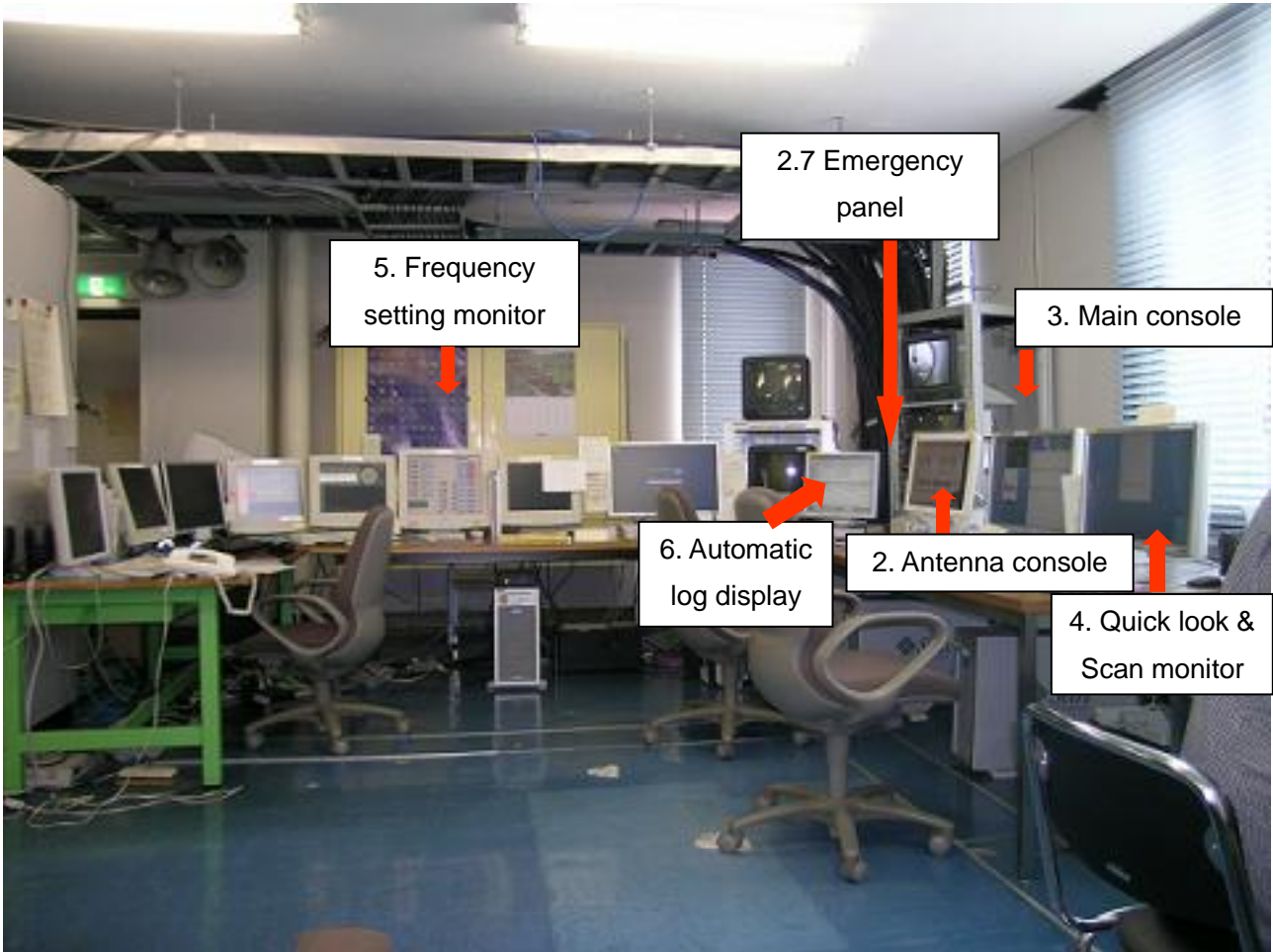
In the following, these functions are explained.

Nobeyama Radio Observatory (NRO) 45 m radio telescope



※) “COSMOS” means space, and the ending is like operating system OS. It was named by Drs. Chikada, Kaifu, Morita et al., around 1978.

View at the Control Room in summer 2010




Control building of the 45 m radio telescope.



2. Antenna Console

The antenna console looks like this as shown below.

There are roughly 5 sections A – E. Each section is explained below. If there is no window

as shown below, please click this icon . When a button is highlighted by an **orange bar**, it means that this button is selected. On the other hand, when the letters in button is **green**, it means that this button can be selected.

Antenna console (labeled “ アンテナ・コンソール ”)

2.1 Section A (Date and time, etc)

At the top of this window, date, local time (**JST**: Japanese standard time, UTC+9h), local sidereal time (**LST**), and modified Julian date (**MJD**) are displayed.

To control from this window, “**PRIORITY**” at the left side in this section must be checked.

2.2 Section B (Main reflector control)

In this section, position of the main reflector and related information are displayed. The actual main reflector position is indicated in azimuth and elevation angles (**REAL**). Differences between the actual position and the program value (**PROG**) are also indicated (**PROG-REAL**). In the lower side, statuses of **SPEED** of the movement, **STOW**, and positional **LIMIT** are also indicated. The numerical values displayed are updated with intervals of 200 msec.

In this section, operational modes of the main reflector are selected:

- **STBY** When the telescope is not used, azimuth and elevation should be in the standby mode. In this mode the brakes are applied.
- **MANUAL** The telescope can be moved manually to the position set by a dial switch or typed from the keyboard. An angle to be moved (12 to 90.03 deg. for elevation and -90 to 450 deg. for azimuth) can be set, and the angle becomes effective by pushing the **SET** button beside the dial switch. When you want to stop the movement, push **STOP** button beside the dial switch (in the **MANUAL** mode).

When it **snows**, move the elevation down to 12 deg. to avoid the accumulation of snow on the main reflector, and usually move the azimuth on the lee.

Azimuth angles (deg.) and actual directions:

West -90, North 0, East +90, South +180, West +270, North +360, East +450

- **PROG** The telescope is controlled by the observing program. **This mode is used for observations.**

Usually the observing program controls the master collimator, and then the main reflector tracks the master collimator. Related buttons for selection of the operational mode exist at the top of this section, **INDIV** and **SLAVE**.

- **INDIV** The main reflector is not yet tracking the collimator.
- **SLAVE** The main reflector will track the collimator. **This mode is used for observations** (Otherwise the scan will not proceed). In this mode, an indicator at "OPTICAL TRACKING" (see the next section for some explanations) becomes **orange**, when the main reflector is actually tracking the collimator. If the positional difference is large between the main reflector and the collimator, an indicator at "OPTICAL TRACKING" is off, and a warning "over range" is indicated in a window at the right side in the Section C (Master collimator control). **This situation often happens, when the telescope is moving toward the target source.**

When there is an earthquake, change the mode to **INDIV**, if possible.

Some cautions:

- Please do not try to move the azimuth, when the elevation angle is more than 80 deg., though such movement is not allowed in this software. Such movement will cause bad effect to the structure of the telescope.
- Please do not leave the telescope in the **MANUAL** mode for a long time.

STOW: It is possible to stow the telescope, for example, when strong wind is expected.

This operation should be done by the assistant (mainly by Mr. Mikoshiba), not by the observers.

- **POS** The main reflector moves to the stow position.
- **LOCK** The main reflector is stowed.
- **REL** The main reflector is released.

Messages concerning the main reflector are indicated in a window at the right side in this section. A list of messages is available in the appendix.

2.3 Section C (Master collimator control)

In this section, position of the master collimator and related information are displayed. The actual position is indicated in azimuth and elevation angles (**REAL**). Differences between the actual position and the program value (**PROG**) are also indicated (**PROG-REAL**). In the lower side, statuses of **SPEED** of the movement, **OPTICAL ERROR**, and positional **LIMIT** are also indicated.

In this section, operational modes of the master collimator are selected:

- **STBY** When the telescope is not used, azimuth and elevation for the collimator should be in the standby mode. In this mode the brakes are applied.
- **MANUAL** The collimator can be moved manually to the position indicated by a dial switch. An angle to be moved (12 to 90.03 deg. for elevation and -90 to 450 deg. for azimuth) can be set with the dial switch, and the angle becomes effective by pushing the **SET** button beside the dial switch.
- **PROG** The collimator is controlled by the observing program. **This mode is used for observations.**

OPTICAL ERROR: The collimator controls the main reflector in the **SLAVE** mode. This control is done with an optical component at the collimator, and consequently a tracking error derived from this optical system can be displayed.

Messages concerning the collimator are indicated in a window at the right side in this section. A list of messages is available in the appendix.

2.4 Section D (Sub-reflector)

In this panel, operational modes of the sub-reflector are selected. The position of the sub-reflector is controlled automatically by the observing program to track the focus of the main reflector, which is designed to keep homologous deformation.

There are three axes to be controlled. The **X** axis is toward the vertical direction. The **Y**

axis is toward the horizontal direction. The **Z1** and **Z2** axes are toward the focus direction. In principle, it is not necessary to control the **Y** axis automatically, because the telescope is made symmetrically in the horizontal direction. Thus, this axis is not controlled automatically.

- **STBY** When the telescope is not used, all four switches should be in the standby mode. The **Y** axis should always be in this mode. In this mode the brakes are applied.
- **MANUAL** The sub-reflector can be moved manually to the position set by a dial switch. The position set becomes effective by pushing the **SET** button beside the dial switch.
- **PROG** The sub-reflector is controlled by the observing program. **This mode is used for observations (**X**, **Z1**, and **Z2**).**

Caution:

- The **Y** axis should always be in the **STBY** mode, even if the telescope is operated.

Messages concerning the sub-reflector are indicated in a window at the right side in this section. A list of messages is available in the appendix.

2.5 Section E (Utilities)

There are several convenient buttons for operations.

- **ZENITH** The main reflector moves to **zenith** (EL 90.03 deg.). This is the most stable position of the telescope. Thus the main reflector should be at zenith, when it is not operated.
- **TUNING** The elevation of the main reflector moves to 70 deg. and the azimuth moves to the program value. This is used for a **tuning** of the receivers.
- **ALL STBY** All buttons will become the **STBY** mode.
- **ALL MAN** All buttons will become the **MAN** mode (except for the **Y** axis of the sub-reflector).
- **ALL PROG** All buttons will become the **PROG** mode (except for the **Y** axis of the sub-reflector).

2.6 Section F (Position viewer)

In this panel, the positions of the main reflector, the collimator, and the program value are schematically shown. The yellow circles indicate the elevation limits of the telescope during operation (~12 deg. and 80 deg.).

2.7 Others

Alarm sound: In case of **ALARM** and **INTERLOCK** at Sections B, C, and D, the indicators will become **red**, and the messages will appear. The alarm also sounds, if the sound is

not muted. The loudness of the sound can be adjusted at the [icon of speaker](#) in the menu bar of the display.

When the window of the antenna console disappeared (!):

- The window may be minimized (iconized). At the right side of the display (DOCK), you will find the icon. If you click it, the window will come again.
- The antenna console may be stopped. Restart the program by clicking the [icon of antenna](#) at the right side of the display (DOCK).

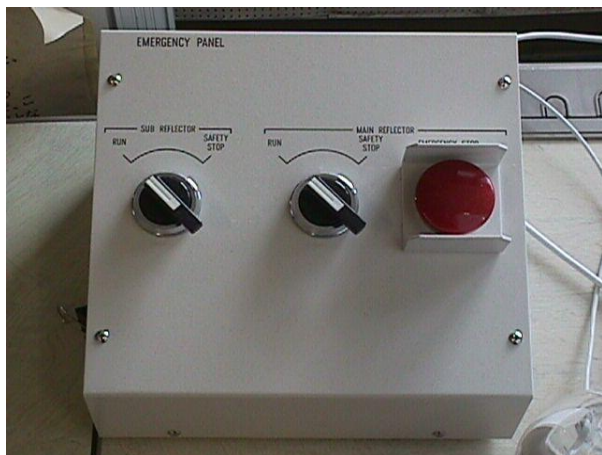
Restart of the window: Select “END of 45console” (actually in Japanese) from the menu “45console” in the menu bar of the display ([Usually please do not stop this program](#)).

Then, restart the program by clicking the [icon of antenna](#) at the right side of the display (DOCK).

Emergency switches and a button

If you want to immediately stop the telescope in case of emergency, turn the black switches ([Run](#) → [Safety stop](#)) at the emergency panel behind the antenna console (see the next picture), and additionally push the **red button**, if necessary.

Emergency Panel (behind the antenna console)



3. Main console

The display of the main console usually looks like this as shown in the next picture. There are about 5 windows.

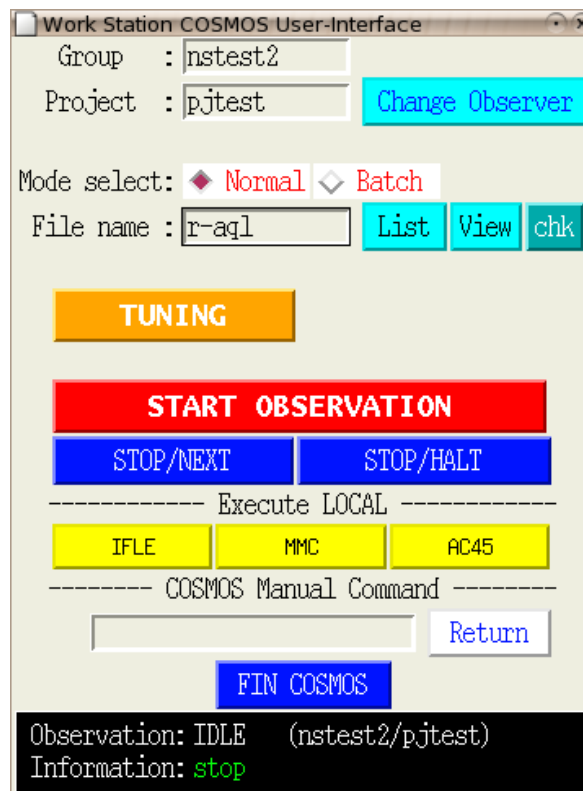
Main Console Display (labeled “メインコンソール”)



3.1 User Interface Window

In the lower left corner, there is a window as shown below.

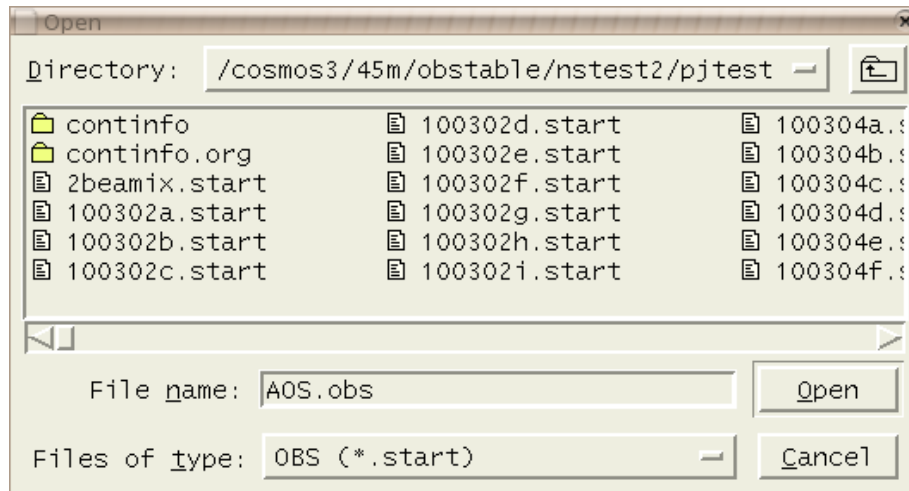
User Interface Window



From this window you put most of commands (click buttons). In the beginning of your

observations you need to put your Group name (ID or account name) and Project name. (Please obtain your Group name and Project name before your observation.) Then, click "[Change Observer](#)" (blue button) with mouse. About Mode select, select "[Normal](#)" (default) in usual case. Now you can see your observational filenames (made and sent with the OBSTABLE software) by clicking "[List](#)" (blue button). The filenames will appear in a newly opened small window as follows.

User Interface Sub-window



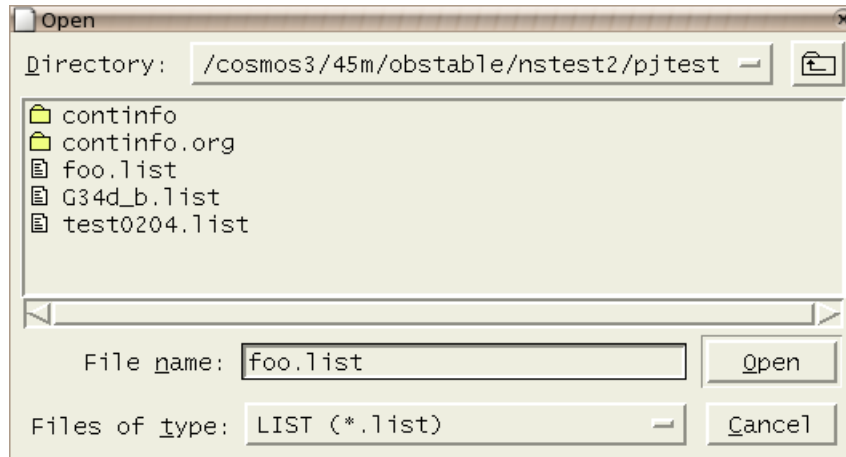
To select a file for observation, choose one file by mouse, and click "[Open](#)". Then a filename is copied to the former "[User interface window](#)".

You can see the file by clicking "[View](#)".

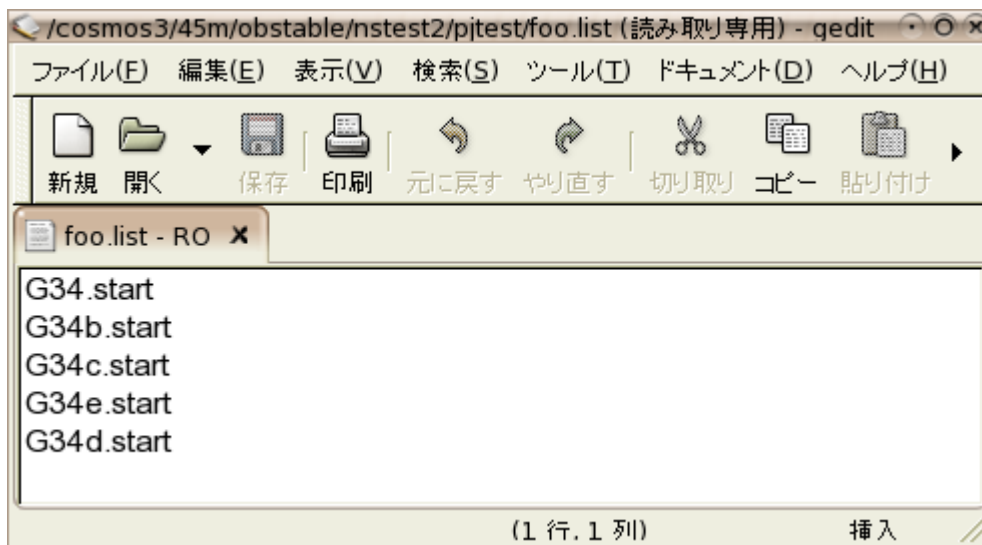
- When you want to start receiver tuning, AOS signal level adjustment, and so on, before you start pointing or main observations, click "[TUNING](#)" (orange button) in the "[User interface window](#)". In this case, instruments necessary only for the tuning and level adjustments are activated, and the antenna will track a source. After tuning and adjustments, click either "[STOP/NEXT](#)" or "[STOP/HALT](#)" (same function in this case) (blue button).
- When you want to start pointing or main observations, click "[START OBSERVATION](#)" (red button) in the "[User interface window](#)". When you want to stop, click either "[STOP/NEXT](#)" or "[STOP/HALT](#)" (same function in this case) (blue button). But please do not stop when the telescope is doing chopper-wheel calibrations (at observing scans R and SKY, which are indicated in the "[Cosmos monitor window](#)" as explained below in section 3.2).
- Scheduler: You can use a function of "[scheduler](#)", if you have already made "schedule file" in the OBSTABLE software. After selecting "[Batch](#)" in Mode select, then you can

select, view, and check the “schedule file” by clicking “[List](#)”, “[View](#)”, and “[chk](#)” (blue buttons), respectively. Following windows and message will appear after clicking each button.

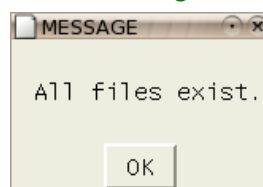
Window to select a “schedule file”



Window to view a “schedule file”



Message after checking a “schedule file”



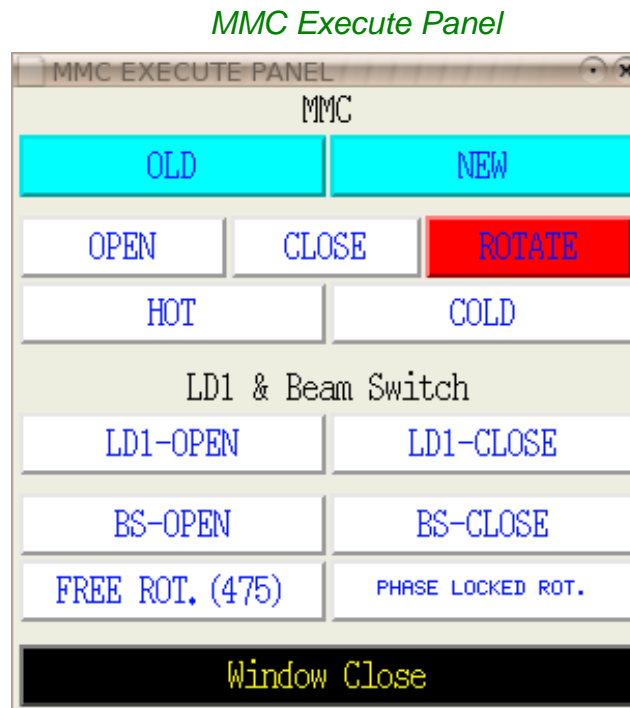
Other functions of the “[User interface window](#)”:

- Adjustment of IF power levels ([IFLE](#))

You can adjust IF power to appropriate levels by clicking “[IFLE](#)” (yellow button).

- Manual operation of the choppers and the beam switch (MMC)

This function is often used to check the movement of the choppers, when they do not work well under computer control, and to rotate and stop the choppers. By clicking “[MMC](#)” (yellow button), following window will appear.



To operate the choppers, first select old beam transmission system (for H22, H30, and H40 receivers) or new system (for S100/S80, Rainbow, and S40 receivers) by clicking “[OLD](#)” or “[NEW](#)”. Then, you can click “[OPEN](#)” (sky), “[CLOSE](#)” (load), or “[ROTATE](#)” (rotate chopper). You can also click “[HOT](#)” load or “[COLD](#)” load. Please return to the “[HOT](#)” load after your trial.

To operate the beam switch, click “[FREE ROT.\(475\)](#)” to rotate, “[BS-OPEN](#)” to stop without deflecting the direction of the beam. Click “[BS-CLOSE](#)” to stop with deflected beam. To put load at the beam switch, click “[LD1-CLOSE](#)”, and to remove load, click “[LD1-OPEN](#)”. A phase-locked rotation with “[PHASE LOCKED ROT.](#)” button is possible by supplying external reference signal.

To leave from this window, click “[Window Close](#)”.

- Setting of the digital backend (AC45)

This function is used for BEARS typically after the tuning. The following window will appear by clicking “[AC45](#)” (yellow button).

AC45 Local Tuning Window

The screenshot shows the 'AC45 LOCAL Tuning' window with the following parameters:

- SW_MODE: POS (selected), FREQ, BEAM
- Table with columns: ARRAY, BAND (T), RX, IF1, LC3[Hz]
- Buttons: Start, Reset, Window Close

ARRAY	BAND (T)	RX	IF1	LC3[Hz]
1	51200	MULT2	230000	0.0000
2	51200	MULT2	230000	0.0000
3	51200	MULT2	230000	0.0000
4	51200	MULT2	230000	0.0000
5	51200	MULT2	230000	0.0000
6	51200	MULT2	230000	0.0000
7	51200	MULT2	230000	0.0000
8	51200	MULT2	230000	0.0000
9	51200	MULT2	230000	0.0000
10	51200	MULT2	230000	0.0000
11	51200	MULT2	230000	0.0000
12	51200	MULT2	230000	0.0000
13	51200	MULT2	230000	0.0000
14	51200	MULT2	230000	0.0000
15	51200	MULT2	230000	0.0000
16	51200	MULT2	230000	0.0000
17	51200	MULT2	230000	0.0000
18	51200	MULT2	230000	0.0000
19	51200	MULT2	230000	0.0000
20	51200	MULT2	230000	0.0000
21	51200	MULT2	230000	0.0000
22	51200	MULT2	230000	0.0000
23	51200	MULT2	230000	0.0000
24	51200	MULT2	230000	0.0000
25	51200	MULT2	230000	0.0000

Buttons: Start, Reset, Window Close

Check observational mode, bandwidth, IF frequency, and used array number, and then click “[Start](#)”. After 1-2 minutes setting of the digital backend will finish with Beethoven’s music sound.

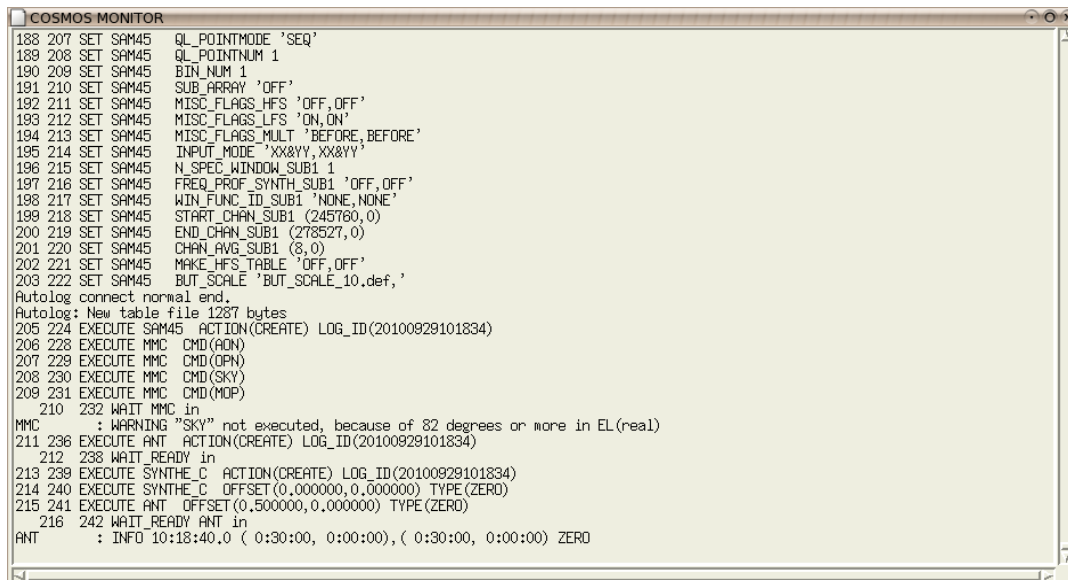
- Manual input of commands

Common users seldom use this function, but line commands for COSMOS can be typed in a space below yellow buttons. Click "[Return](#)" to execute.

3.2 Cosmos Monitor Window

In the lower right corner there is a window as shown below.

Cosmos Monitor Window



```
COSMOS MONITOR
188 207 SET SAM45 QL_POINTMODE 'SEQ'
189 208 SET SAM45 QL_POINTNUM 1
190 209 SET SAM45 BIN_NUM 1
191 210 SET SAM45 SUB_ARRAY 'OFF'
192 211 SET SAM45 MISC_FLAGS_HFS 'OFF,OFF'
193 212 SET SAM45 MISC_FLAGS_LFS 'ON,ON'
194 213 SET SAM45 MISC_FLAGS_MULT 'BEFORE,BEFORE'
195 214 SET SAM45 INPUT_MODE 'XX&YY,XX&YY'
196 215 SET SAM45 N_SPEC_WINDOW_SUB1 1
197 216 SET SAM45 FREQ_PROF_SYNTH_SUB1 'OFF,OFF'
198 217 SET SAM45 WIN_FUNC_ID_SUB1 'NONE,NONE'
199 218 SET SAM45 START_CHAN_SUB1 (245760,0)
200 219 SET SAM45 END_CHAN_SUB1 (278527,0)
201 220 SET SAM45 CHAN_AVG_SUB1 (8,0)
202 221 SET SAM45 MAKE_HFS_TABLE 'OFF,OFF'
203 222 SET SAM45 BUT_SCALE 'BUT_SCALE_10.def,'
Autolog connect normal end.
Autolog: New table file 1287 bytes
205 224 EXECUTE SAM45 ACTION(CREATE) LOG_ID(20100929101834)
206 228 EXECUTE MMC CMD (ADN)
207 229 EXECUTE MMC CMD (OPN)
208 230 EXECUTE MMC CMD (SKY)
209 231 EXECUTE MMC CMD (MDP)
210 232 WAIT MMC in
MMC : WARNING "SKY" not executed, because of 82 degrees or more in EL(real)
211 236 EXECUTE ANT ACTION(CREATE) LOG_ID(20100929101834)
212 238 WAIT_READY in
213 239 EXECUTE SYNTH_C ACTION(CREATE) LOG_ID(20100929101834)
214 240 EXECUTE SYNTH_C OFFSET(0,000000,0,000000) TYPE(ZERO)
215 241 EXECUTE ANT OFFSET(0,500000,0,000000) TYPE(ZERO)
216 242 WAIT_READY ANT in
ANT : INFO 10:18:40.0 ( 0:30:00, 0:00:00), ( 0:30:00, 0:00:00) ZERO
```

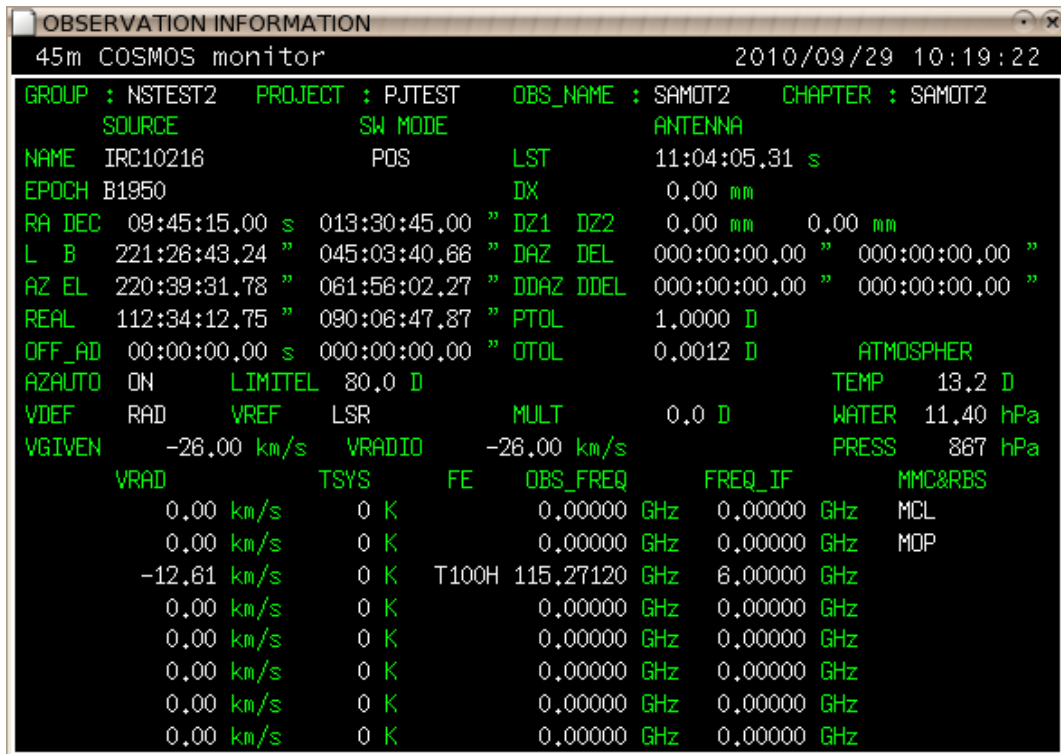
This window mainly provides information on each observing scan (ZERO, R, SKY, OFF, or ON), warning messages (sentences with **yellow blinks**), and error messages (sentences with **red blinks**). Most of the warning messages may be ignored, but the error messages force the observations to stop. It may be useful to make a hardcopy of such messages to record them by clicking "[screen dump](#)" icon.

Some typical messages are listed in the Appendix. In addition, after you click "[Change Observer](#)" button, it is acknowledged in this window.

3.3 Observing Information Window

In the upper left corner there is a window as shown below.

Observing Information Window



This window shows many basic observing parameters such as source name, coordinate, velocity, pointing offset, weather information, system temperature, etc. These parameters are very useful to observers, and check these parameters during observations occasionally.

3.4 Local Controller Activities Window

In the upper right corner there is a window as shown below.

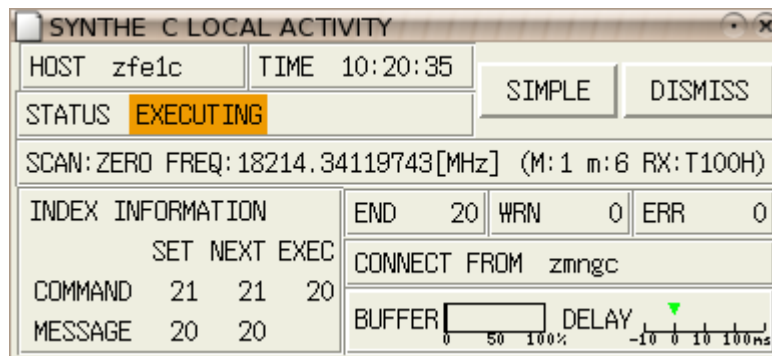
Local Controller Activities Window



There are many workstations (local controllers) to control local instruments. Status of each local controller is displayed by color in this window. To see the status of each local controller in some more detail, click each button. An example for SYNTHE-4 is shown

below.

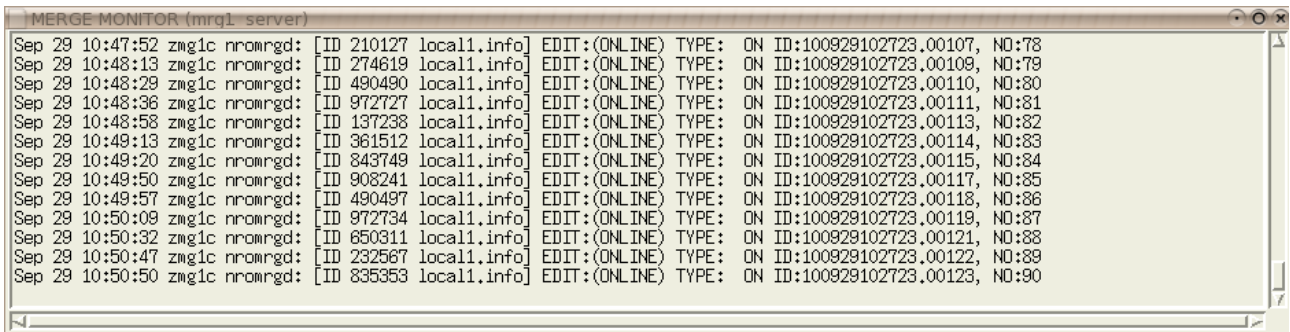
Detailed Local Controller Activities: SYNTH-4



3.5 Merge Monitor Window

In the middle right corner there is a window as shown below.

Merge Monitor Window



“Merge” is processes of initial automatic data reduction and data storage. This is a monitor window to provide status of these processes.

4. Quick look & Scan monitor

The monitor display of “Quick look & Scan monitor” looks, for example, like this as shown in the next picture.

Quick Look & Scan Monitor Display (labeled “Scan Monitor & QLOOK”)




This display has mainly two functions; quick look of observing spectra and scan monitor of the telescope. The scan monitor means that it shows graphically a position where telescope is pointing every moment in the sky, e.g. an OFF position or ON position within, for example, a mapping grid.

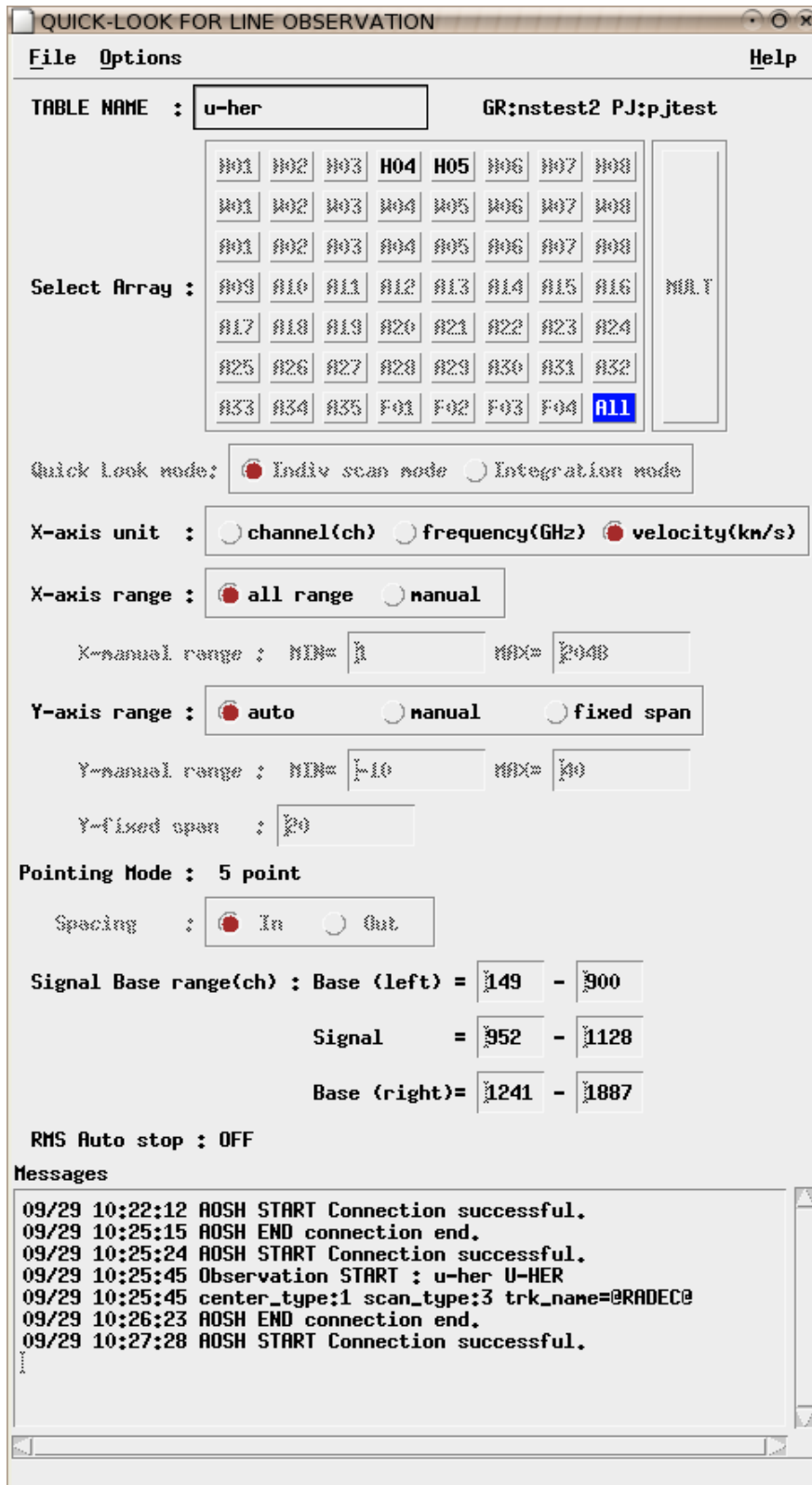
4.1 Quick look

After starting the observations, you can immediately see observed raw spectra. *Example of position switch observations is shown below. In the case of OTF observations similar but slightly different window will appear. In any case, an appropriate quick look system is automatically activated.*

From the “Quick-look for line observation” window as follows, please select display modes if necessary; individual scan mode or integration mode, X-axis unit and range, and Y-axis range (these modes can also be changed later from a pull-down menu of each spectrum). Then click name(s) of AOS you want to look at. You can also use “ALL” button to see spectra from all spectrometers in use. If there is no window as shown below,

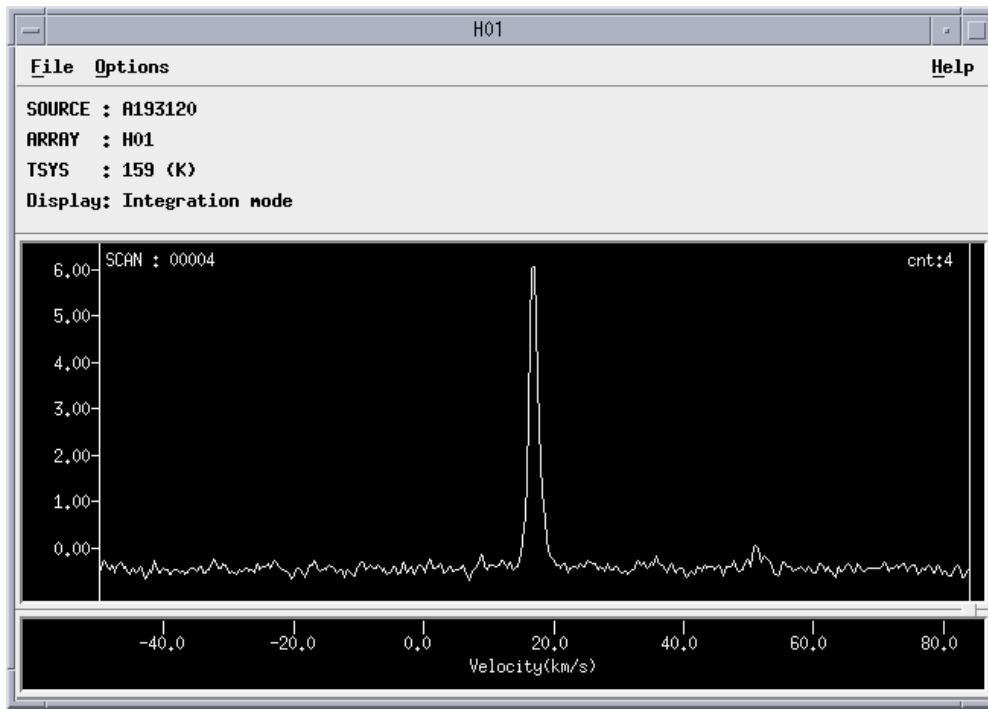
please click this icon .

Quick Look for Line Observation Window



An example of quick look of a spectrum is shown below.

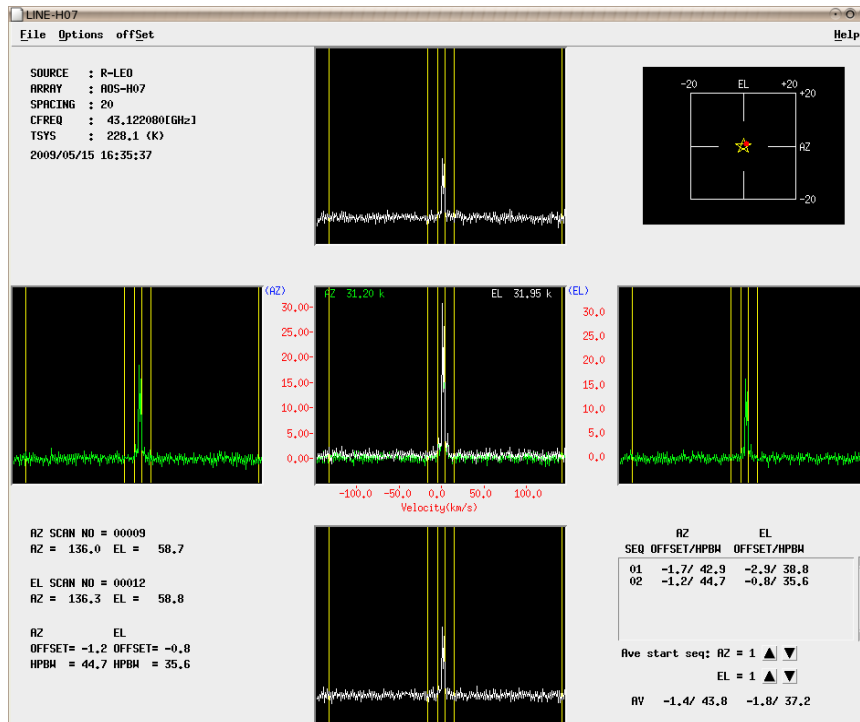
Example of Quick Look of Spectra (position switching)



Please check this quick look at least in the beginning of the observations to see whether the data is properly obtained. From the pull-down menu of the quick look window, it is possible to change the integration mode (individual scan or integration), the display range (e.g. enlarge, full-range) of the spectrum, and the unit of the X-axis (velocity, frequency, and channel). It is also possible to enlarge the spectrum by drawing a box on the spectrum with mouse. To read accurate intensity, it is generally necessary to enlarge the spectrum, in particular, for narrow lines, because limited number of channel points can be displayed in the window.

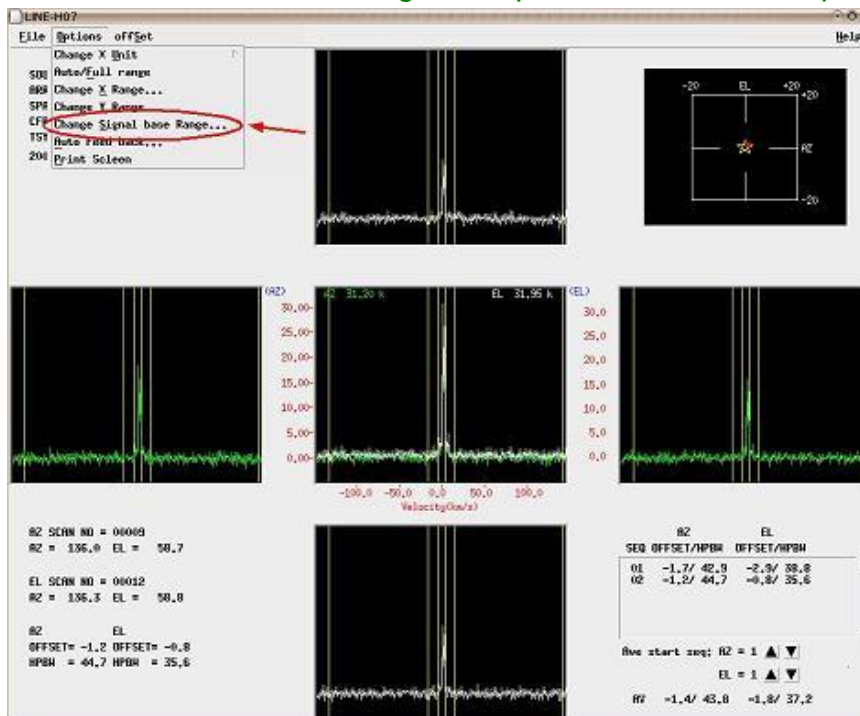
In case of pointing observations (5 points cross scans), a method to see the quick look is basically the same. Displayed spectra are arranged like cross directions as shown below to easily see pointing deviations intuitively.

Quick Look Window for Pointing



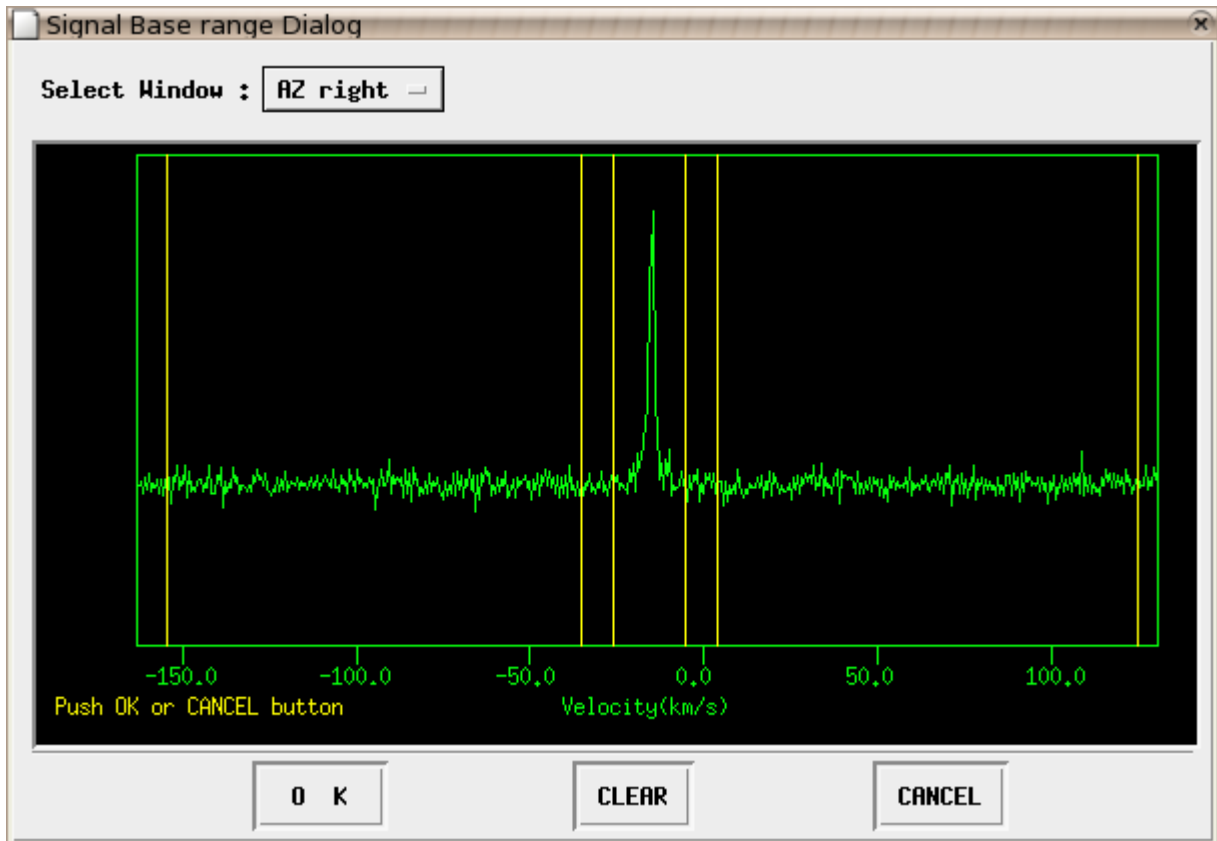
To calculate pointing offsets to be corrected by fitting data of cross scans, you need to provide baseline ranges and a line (SiO) range in a “Signal base range dialog” window. To show this window, please select “Change signal base range” from a pull-down menu of “Options” as shown below.

Quick Look Window for Pointing with a pull-down menu of “Options”



Then “[Signal base range dialog](#)” window appears. Please set by mouse (from left to right) two positions to indicate a left baseline range, two positions for a line (SiO) range, and two positions to indicate a right baseline range as shown below. Then click “[OK](#)”.

Signal Base Range Dialog




Left baseline range

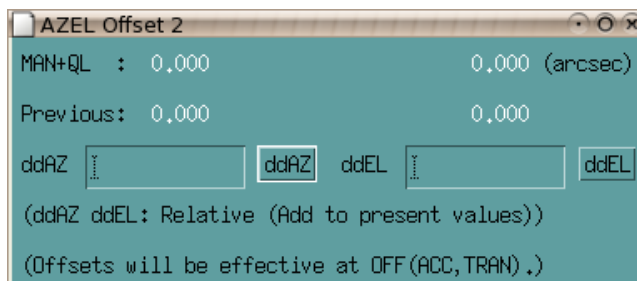
Line(SiO)

Right baseline range

The pointing offsets and beam sizes are displayed in the lower right corner of the quick look window. It is possible to calculate averages of results of several cross scans. A starting sequence number for average can be selected by clicking ▲ and/or ▼ buttons in the quick look window. If you obtain reliable offsets (and beam sizes which are about 39 arcsec in ideal case), you can apply them for correction in the “[AZEL offset](#)” window as shown below. Please type the correction values (arcsec) in the “[ddAZ](#)” and/or “[ddEL](#)” input box(es) (without changing the sign), and then click “[ddAZ](#)” and/or “[ddEL](#)” button(s). The corrections will become effective, when the telescope is at an OFF position. If there is no

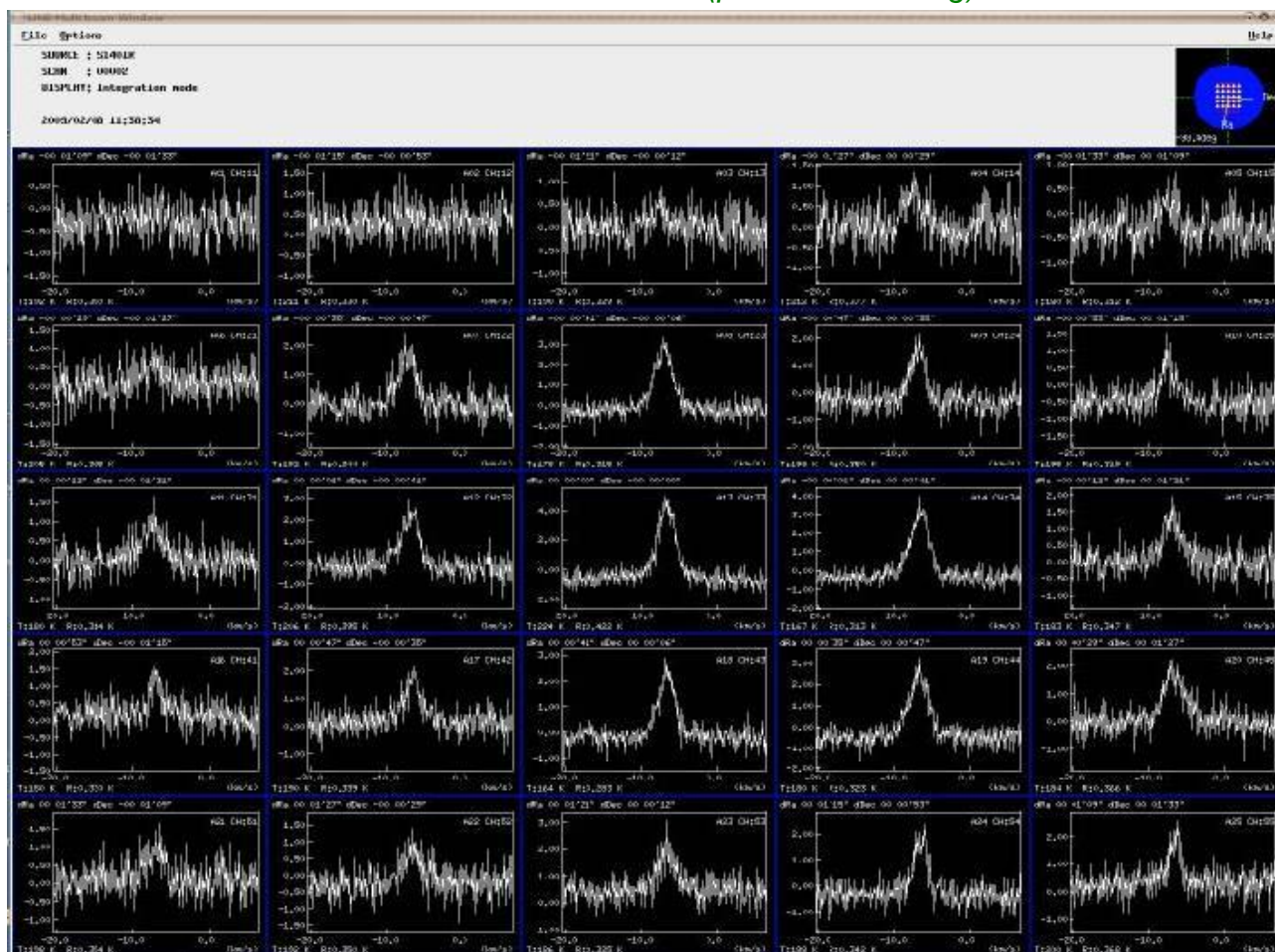
window as shown below, please click this icon .

AZEL Offset Window



In case of BEARS, please click “Mult” button in the “Quick-look for line observation” window. An example of quick look is shown below.


Quick Look Window for BEARS (position switching)



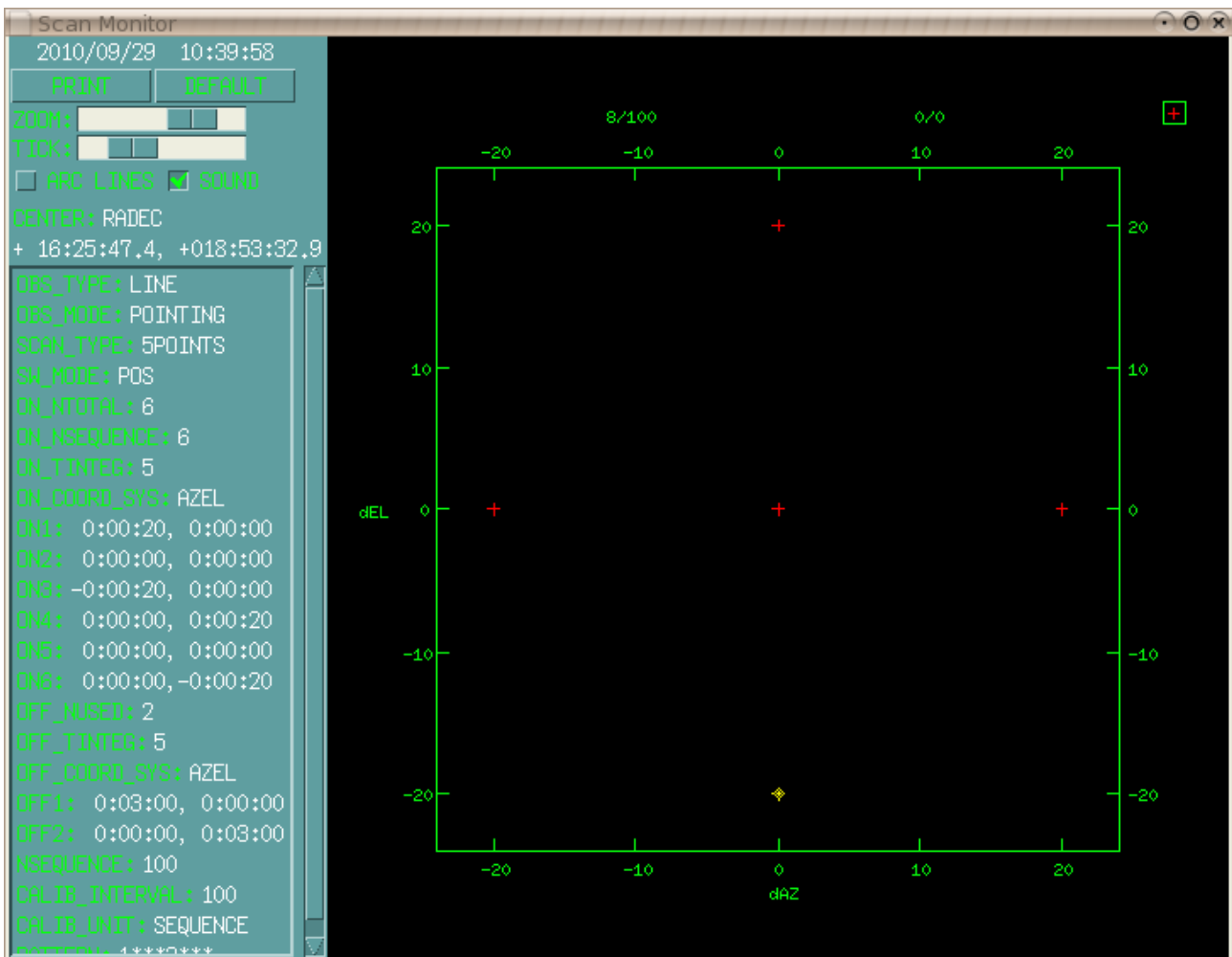
The function of quick look for BEARS is basically the same as that for the single beam receivers. In addition, a coordinate for each spectrum is added, and a position of the rotational stage of BEARS is schematically shown.

4.2 Scan monitor

The scan monitor window "Scan Monitor" looks like this as shown below. This is an example when pointing observations are done. The 5 points cross scan is indicated graphically. This window has functions of zoom, print, etc. This monitor is particularly useful to check observing points and progress of mapping observations. Please check this scan monitor occasionally, in particular, during mapping observations (including pointing) whether the telescope is moving as the observers intended. Scan parameters as defined in your "scan table" made with the OBSTABLE software are also shown in the left

side of this window. If there is no window as shown below, please click this icon .

Scan Monitor Window



5. Frequency setting monitor

The monitor display of “Frequency setting” looks like this as shown in the next picture.

Frequency Setting Display (labeled “ 周波数設定 ”)



Frequency diagram from frontend to backend is shown here. Observers can check their actual frequency setting of the local oscillators and filters (defined in your “device table” made with the OBSTABLE software) in this display. In addition power levels of the IF lines can be checked.

6. Automatic log

6.1 Basic functions

Observational log is automatically made and displayed as shown below.

Automatic Log Display (labeled “観測ログ作製システム”)



An upper window is for main observations, and it is shown below.

Auto Log for Current Observation Window “Auto Log (alco)”

DATE-TIME	SCAN-NUMBER	SCHEDULE	OBSERVE	SOURCE	COMMAND	AZ	EL	DIR	SPEED	Tsys(K)	COMMENT
10/09/28 13:41:28		SAMOT2	SAMOT2	IRC10216	TSYS	268.2	25.6	30	4.3	648/T100H	
10/09/28 14:08:16		SAMOT2	SAMOT2	IRC10216	END	272.4	19.8	30	4.3		
10/09/28 14:18:50		SAMOT4	SAMOT4	W51J2000	START	91.5	27.6	30	4.3		
10/09/28 15:01:11		SAMOT4	SAMOT4	W51J2000	END	98.6	36.6	30	4.3		
10/09/28 15:02:06		SAMOT4	SAMOT4	W51J2000	START	98.4	36.3	30	4.3		
10/09/28 15:03:59		SAMOT4	SAMOT4	W51J2000	TSYS	98.7	36.7	30	4.3	419/T100H	
10/09/28 16:11:16		SAMOT4	SAMOT4	W51J2000	END	112.6	50.2	30	4.3		
10/09/29 10:22:05		SAMOT2	SAMOT2	IRC10216	ABORT	143.3	61.6	40	1.4	0/T100H	
10/09/29 10:25:17		U-HER	U-HER	U-HER	ABORT	91.6	19.8	29	2.1	0/H40	
10/09/29 10:25:19		U-HER	U-HER	U-HER	START	91.1	19.8	29	2.1		
10/09/29 10:26:26		U-HER	U-HER	U-HER	END	80.6	20.0	349	2.4		
10/09/29 10:27:37		U-HER	U-HER	U-HER	START	80.8	20.3	8	2.8		
10/09/29 10:28:01		U-HER	U-HER	U-HER	TSYS	80.8	20.4	26	3.5	244/H40	

Double-click (left button on the mouse) on a selected row to change to an input mode for inserting comments

You can put your name, title of your observation, and weather. Please click “[SET](#)” buttons after you put them. System temperatures are recorded, if you click “[MEMO](#)” button. In each line you can write comments by clicking at the desired line as shown below. Please write your comment at the newly appeared comment input box, and click “[SET](#)” button.

(Finally,) you can send this log file with mail, by clicking “[MAIL](#)” buttons. If there is no

window as shown above, please click this icon



Current Observation Log Window with Comment Input Box

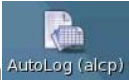
DATE-TIME	SCAN-NUMBER	SCHEDULE	OBSERVE	SOURCE	COMMAND	AZ	EL	DIR	SPEED	Tsys(K)	COMMENT
10/09/28 15:03:59		SAMOT4	SAMOT4	W51J2000	TSYS	98.7	36.7	30	4.3	419/T100H	
10/09/28 16:11:16		SAMOT4	SAMOT4	W51J2000	END	112.6	50.2	30	4.3		
10/09/29 10:22:05		SAMOT2	SAMOT2	IRC10216	ABORT	143.3	61.6	40	1.4	0/T100H	
10/09/29 10:25:17		U-HER	U-HER	U-HER	ABORT	91.6	19.8	29	2.1	0/H40	
10/09/29 10:25:19		U-HER	U-HER	U-HER	START	91.1	19.8	29	2.1		
10/09/29 10:26:26		U-HER	U-HER	U-HER	END	80.6	20.0	349	2.4		
10/09/29 10:27:37		U-HER	U-HER	U-HER	START	80.8	20.3	8	2.8		
10/09/29 10:28:01		U-HER	U-HER	U-HER	TSYS	80.8	20.4	26	3.5	244/H40	
10/09/29 10:44:52		U-HER	U-HER	U-HER	MEMO	83.1	23.7	64	0.4	244/H40	
10/09/29 10:44:53		U-HER	U-HER	U-HER	MEMO	83.1	23.7	64	0.4	244/H40	
10/09/29 10:44:54		U-HER	U-HER	U-HER	MEMO	83.1	23.7	64	0.4	244/H40	
10/09/29 10:45:46		U-HER	U-HER	U-HER	MEMO	83.2	23.9	351	1.6	244/H40	
10/09/29 10:46:22		U-HER	U-HER	U-HER	MEMO	83.3	24.0	357	1.1	244/H40	

A lower window is for pointing observations, and it is shown below.

Auto Log for Current Pointing Window “Auto Log (alcp)”

DATE-TIME	SOURCE	v=1	v=2	AZ	EL	D_AZ	D_EL	DD_AZ	DD_EL	TEMP	WATER	PRESS	DIR	SPEED	COMMENT
10/09/29 10:25:17	U-HER			91.6	19.8					+13.9	11.5	870	29	2.1	
10/09/29 10:25:19	U-HER			91.1	19.8					+13.9	11.5	870	29	2.1	
10/09/29 10:27:37	U-HER			80.8	20.3					+14.0	11.5	870	8	2.8	
10/09/29 10:28:01	U-HER			80.8	20.4	0.0	0.0			+14.3	11.8	870	26	3.5	

In each line you can record antenna temperatures of SiO maser lines by clicking at the desired line as shown below. Please record the antenna temperature at the newly appeared input box, and click “[SET](#)” button. Observers are requested to record antenna temperatures. The recorded intensities are useful information also for other observers, because the intensities are variable. The recorded intensities can be easily searched for in the OBSTABLE software. And you can send this log information with mail, by clicking

“[MAIL](#)” buttons. If there is no window as shown above, please click this icon .

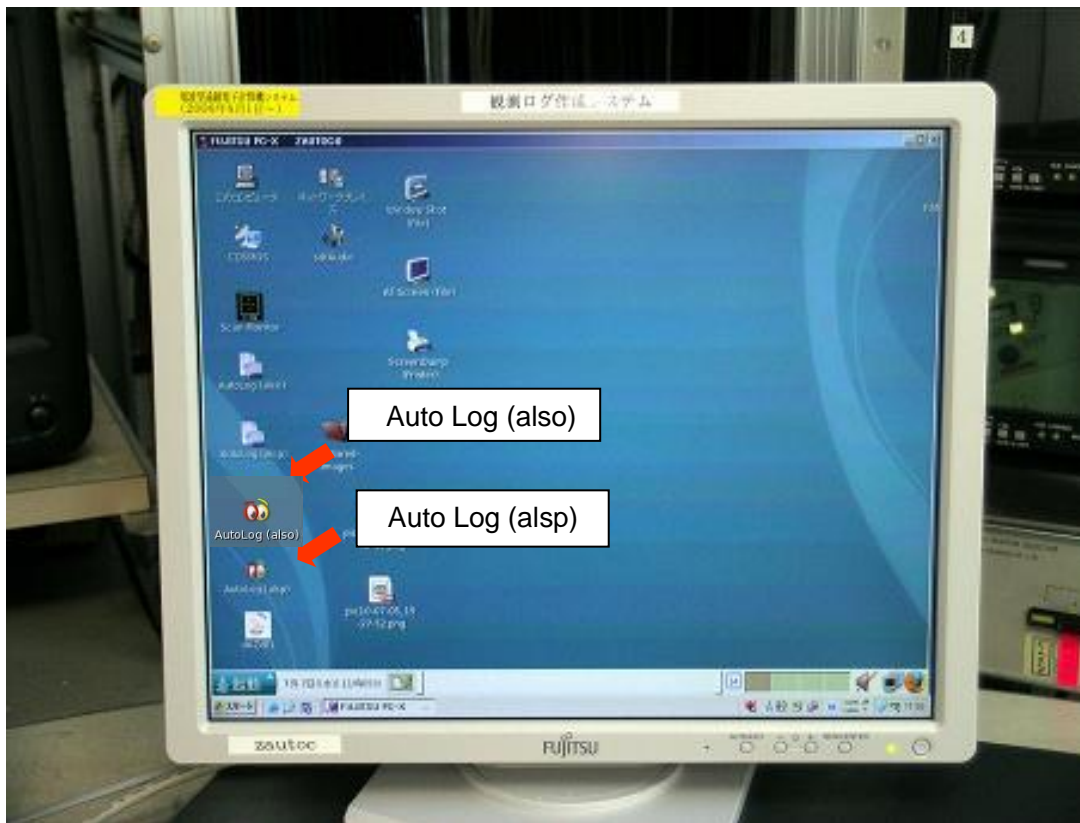
Current Pointing Log Window with Antenna Temperature (Ta*) Input Box

DATE-TIME	SOURCE	v=1	v=2	AZ	EL	D_AZ	D_EL	DD_AZ	DD_EL	TEMP	WATER	PRESS	DIR	SPEED	COMMENT
10/09/29 10:25:17	U-HER			91.6	19.8					+13.9	11.5	870	29	2.1	
10/09/29 10:25:19	U-HER			91.1	19.8					+13.9	11.5	870	29	2.1	
10/09/29 10:27:37	U-HER			80.8	20.3					+14.0	11.5	870	8	2.8	
10/09/29 10:28:01	U-HER			80.8	20.4	0.0	0.0			+14.3	11.8	870	26	3.5	
10/09/29 10:44:52	U-HER			83.1	23.7	0.0	0.0			+14.7	12.0	870	64	0.4	
10/09/29 10:44:53	U-HER			83.1	23.7	0.0	0.0			+14.7	12.0	870	64	0.4	
10/09/29 10:44:54	U-HER			83.1	23.7	0.0	0.0			+14.7	12.0	870	64	0.4	
10/09/29 10:45:46	U-HER			83.2	23.9	0.0	0.0			+14.7	12.0	870	351	1.6	
10/09/29 10:46:22	U-HER			83.3	24.0	0.0	0.0			+14.8	12.2	870	357	1.1	



6.2 Search for old log

In addition you can search for old log from search windows, which will appear from the buttons as shown below.

Pull-down Menu to Show Search Windows



The search windows look like these as shown below for the main observations “Auto Log (also)” and pointing observations “Auto Log (alsp)”, respectively. If there is no window as

shown below, please click these icons  and .

Search Window for Main Observations

SEARCH LOG OF OBSERVATION											
QUIT	29th period	DATE	-	GRP,PRJ	OBSERVER	CLEAR		SEARCH	PRINT	MAIL	
SCHEDULE	OBSERVE	SOURCE	RECEIVER	FREQUENCY							
DATE-TIME	SCAN-NUMBER	SCHEDULE	OBSERVE	SOURCE	COMMAND	AZ	EL	DIR	SPEED	Tsys (K)	COMMENT

Search Window for Pointing

DATE-TIME	SOURCE	v=1	v=2	AZ	EL	D_AZ	D_EL	DD_AZ	DD_EL	TEMP	WATER PRESS	DIR	SPEED	COMMENT
-----------	--------	-----	-----	----	----	------	------	-------	-------	------	-------------	-----	-------	---------

To search for old log, select period of observing season (e.g. “The 20 th period” between November 2001 and June 2002), and then put search conditions. When you want to search for your own log, put your group name and project name at “GRP.PRJ” input box (for example put q8001st.test for group name of “q8001st” and project name of “test”). Then click “[SEARCH](#)”.

The search function is also available in the OBSTABLE software. And you can send your log with mail, by clicking “[MAIL](#)” buttons.

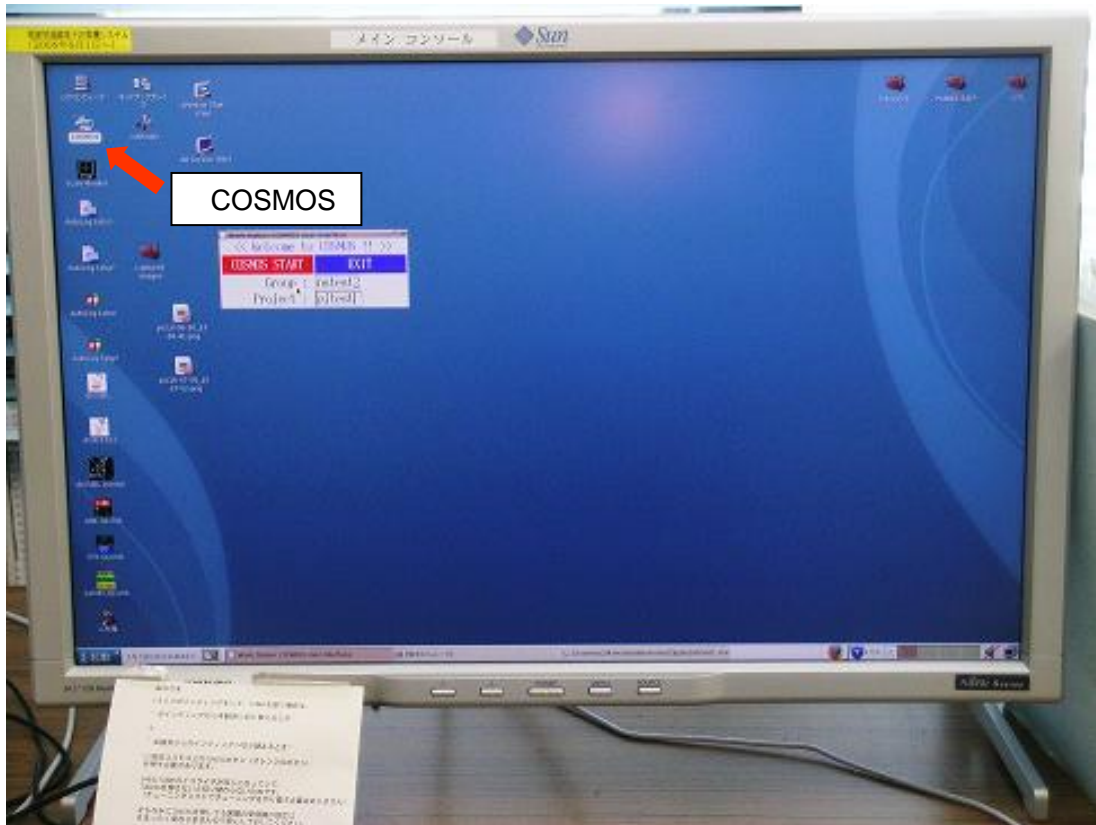
Appendix

A.1 Start and quit of the software COSMOS

To quit the software, just click "[FIN COSMOS](#)" in the "User interface window" (section 3.1).

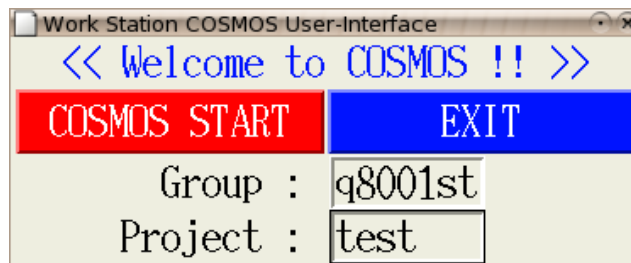
To start the software, click the "COSMOS" icon  as shown below.

Button to Start COSMOS



Then, the following window appears.

A Small Window to Start COSMOS



In this window you need to put your Group name (ID or account name) and Project name. Then, click "[COSMOS START](#)".

A.2 Hardware reset of intensity calibration system (MMC, cf. section 3.1)

It sometimes happens that the intensity calibration system does not work. In such case, spectra look abnormally spiky, and the value of the system temperature displayed on the main console is strange. This trouble may be solved, if you just restart the observation. Or check the function of the calibration system manually from the “[User interface window](#)” as explained in the section 3.1. If it works manually, please try to restart the observation. If it still does not work, it is necessary to reset the hardware of the calibration system in the lower cabin of the 45 m telescope.

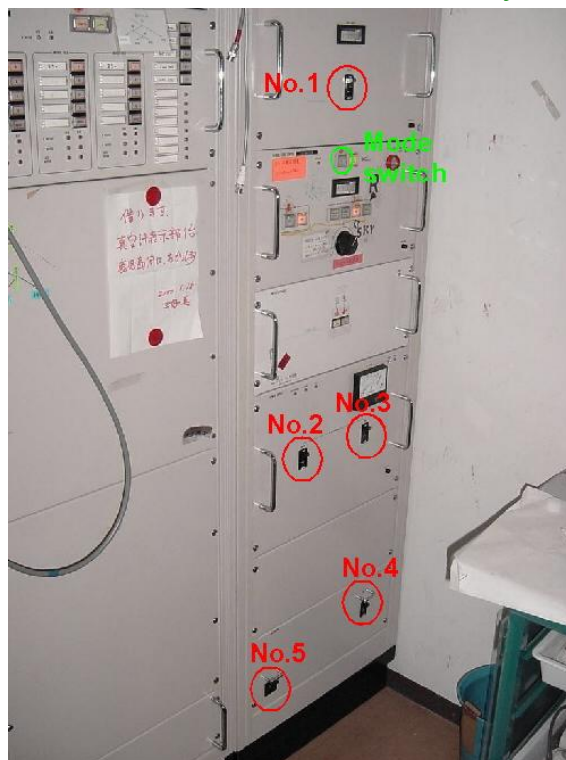
There are two calibration systems in the cabin; the new system and old system as shown below. Reset the system for your receiver.

	Receivers
Old calibration system	H22, H30, H40
New calibration system	S40, S100/80, T100, TZ

A.2.1 How to reset the hardware of the old system

Go to the lower cabin of the 45m telescope. [Near the BEARS receiver](#) there is a control panel of the old calibration system as shown below (ask to the assistant for details).

Control Panel of the Old Calibration System



Switch off from No.1 to No.5 one by one slowly. Then, switch on from No.5 to No.1 one by one again slowly. Finally, select a mode switch to PC (program control). Try to restart your observation at the main console.

A.2.2 How to reset the hardware of the new system

Go to the lower cabin of the 45m telescope. **Near the S40 receiver** there is a control panel of the new calibration system as shown below (ask to the assistant for details).

Control Panel of the New Calibration System



Similar to the old system, switch off from No.1 to No.5 one by one slowly. Then, switch on from No.5 to No.1 one by one again slowly. Finally, select a mode switch to PC (program control). It may be better to reset also the hardware of old system, because the new system is controlled via the old system. Try to restart your observation at the main console.

A.3 List of warning or error messages, which often appear at the main console

(Details of each message are not always the same.)

- **ANT: "EL.(XXXX) >< the upper(lower) limit(XXXX)"**
Message alerting elevation limit. Elevation should be between 13 and 80 deg.
- **MMC: xxx yyy ERR GPIB write error (send): TACS <Talker>**
Message indicating some communication error at the intensity calibration system (MMC).
Just restart your observation, or check the system from the main console (see section 3.1), or reset the hardware (see section A.2).

- **ANT: Too many prog errors after "ON SOURCE"**
Difference between program positions and real positions exceeded a certain times (normally 60 times). This warning often happens when wind is rather strong.
- **AOS-H (or W): "AVE SRQ wait Time out. Dummy data write."**
Some communication error between the AOS local controller and the averager. Usually the situation recovers automatically. If not, please restart your observation.
- **AC45: Warning BSTATE flag detected. Now checking each correlator.**
AC45: xxx yyy ERR BSTATE #1: Data clock signal (LSI0) not receive.
Just try to restart your observation.

For details, please see the tables below. (Sorry for Japanese only.)

COSMOS 警告エラー

頻度	警告(黄字)	意味	対策 (薄緑の部分がアシスタントおよび観測者で対処できると思われる部分。それ以外は担当者に連絡)
多	WAR command START: Can't accept. COSMOS isn't in idle mode.	観測中に START を再度実行した。	再度 START したいときには、一度 STOP してから START する。
時々	ANT : WARNING El.(80.424934+(0.000000)) > the upper limit(80.000000)	望遠鏡の高度(EL)がリミット値より高い。(リミット値がアンテナに送られる)	OBSTABLE(source table)、観測時刻を見直す。
多	AC45 : WARNING BSTATE flag detected. Now checking each Correlator.	相関器のハードエラーを検出 BSTATE コマンドにより各相関器を確認中(時間要)	再度 START してみる。それでもおかしいときには、BSTATE の結果を下に、ハードの状態を確認する。-->AC45 のマニュアル参照
	AC45 : WARNING IFconv warning, reached 00[dB] ARRAY=17	レベル調整でのアッテネータ値が 0[dB]に達した。 これより下回る設定は不可	OBSTABLE(device table)の見直し。受信機のレベルが低くなっている可能性も有り得る。
	AC45 : WARNING Not enough for the logging.(iflg:1,21508)	OTF 観測で、ロギング処理が追い付かない(性能的な限界)。 カッコ内の数値は(フラグ番号, 相関データの START_IP)	OTF 担当者に連絡

	AC45 : WARNING Set dummy data, Illegal START-IP number.(18747 1060688677)	相関器より出力されたデータの START_IP 番号が異常 カッコ内の数値は【本来の正しい番号, 検出した異常値】	AC45 担当者に連絡 ハード側の問題として調査する。
時々	ANT : WARNING El.(-0.031027+(0.000000)) < the lower limit(12.000000)	望遠鏡の高度(EL)がリミット値より低い。(リミット値がアンテナに送られる)	OBSTABLE(source table)、観測時刻を見直す。
たまに発生	ANT : WARNING Too many PROG errors after "ON SOURCE".	オンソース後に、多数の追尾誤差が発生した。	追尾がずれている可能性がある。強風のときに発生しやすい。(強風でないときに発生するのは異常である。)
たまに発生	AOS(H,W) : WARNING AVE SRQ read Time out. Dummy data write.	AOS の積算器(AVE)から SRQ が上がって来ず、ダミーデータをファイルに出力した。	再度 START してみる。一般的にはこれで再開できる。頻繁に発生する様なら、AOS 室のアベレージャー装置の GP-IB のリセットを実施。それでもだめなら、電源 OFF, ON も試す。
	IFLE : WARNING PC not read the file. Time out.	COSMOS が設定値をファイルへ書き込み後、PC 側でファイル読み込み完了フラグを返さない。	周波数設定の PC が正常動作しているかどうかを状態確認する。(画面上の時刻が更新されているか?)
時々	MMC : WARNING "SKY" not executed, because of 82 degrees or more in EL(real)	EL が 82 度以上のため、LD1 を抜く(SKYにする)事ができない。	EL を 82 度以下に下げる。
	RXR : WARNING The reach of <WARNING> angle. (130.002855)	受信機回転角が警告リミット範囲内に入った	OBSTABLE(device table)での受信機回転角の初期値を変更する。
	SYNTHE_A(または B,C,or D と表示) : WARNING LOCAL_FREQ is higher than 40.000000GHz. (52.802372)	算出した第一ローカル周波数が許容範囲を超えている (SYNTHE_A: 4 台あるうちの1台目)。 左記の場合、最大のシンセサイザ逡倍次数を使用し、処理は継続 (/cosmos3/45m/etc/synthe.defより取得)	OBSTABLE(device table)の周波数設定を見直す。

	エラー(赤字)	意味	対策
	ERR command EXECUTE : local <i>localname</i> . not connected.	ローカルとマネジャーのソケットが繋がっていない。	ローカルモニタでワークステーションの状態が青色か確認し、青で無い場合は起動(boot)させる。 もしくは指示書内で OPEN 文がコメントになっていないか確認する。
	ERR command SET: local <i>localname</i> . not connected.	同上	同上
	AC45 : ERR Correlation error, Communication Error, Illegal SRQ status.(hex:0) COUNT:37	コマンド送信後、装置が完了ステータスを返さない。	ハード状態の確認-->AC45のマニュアル参照
多	AC45 : ERR BSTATE #13: Data clock signal (LSIO) not receive.(0101000000000000) COUNT	BSTATE によるハードエラーの詳細結果 左記の場合、13BEAM で clock を受け取れない	ハード状態の確認-->AC45のマニュアル参照
	AC45 : ERR IFconv error(4), OUTPUT-LEVEL limit over.(+3.0) COUNT:2	チューニングの際、IF コンバータの出力レベルの範囲を超えた	OBSTABLE(device table)の見直し。
	BSB : ERR Instruction Not get param. (name: TUNING) COUNT:1	TUNINGというSET情報が指示書に存在しない	指示書の確認 または観測者に OBSTABLE から観測テーブルを再度 save&send してもらう。
	CONT_BE : ERR Instruction Not get param. (name: GROUP) COUNT:1	GROUPというSET情報が指示書に存在しない	指示書の確認 または観測者に OBSTABLE から観測テーブルを再度 save&send してもらう。
	CONT_BE : ERR Not connect with <CONT_BE> error. COUNT:1	連続波観測プログラム(bol)へコネクションできない	連続波の担当者に連絡(プログラムの起動もしくは状態確認)
	IFATT : ERR libclr(GPIB-lib) specified device error EBUS <Command error> COUNT:2	GPIB のデバイスクリア時、エラーを検出	IF の ATT の担当者に連絡(ハード状態の確認)

	MMC : ERR LOCKSTAT file not open (/cosmos3/45m/file/mmc/mmc.dat) COUNT:1	LOCKSTAT ファイルがオープンできない。	計算機の担当者に連絡(ファイルの存在有無を確認)
多	MMC : ERR GPIB (Send): ATN <Attention is asserted> COUNT:11	GPIB でのコマンド送信時、エラーを検出	再度 START してみる。それでもおかしいときには、望遠鏡下部機器室の MMC ハードのリセット
多	MMC : ERR GPIB (Send): TACS <Talker> COUNT:4	GPIB でのコマンド送信時、エラーを検出	再度 START してみる。それでもおかしいときには、望遠鏡下部機器室の MMC ハードのリセット
	QLSV : ERR history file get error.	ロギングファイル情報が読めない。	致命的エラー 計算機の担当者に連絡
	MULT_MMC : ERR No response from PC side. Over 40[s] limit-time !! COUNT:1	COSMOS が設定値をファイルへ書き込み後、PC 側でファイル読み込み完了フラグを返さない。	BEARS 調整の PC が正常動作しているかどうかを状態確認する。
	RXR : ERR No response from PC side. Over 180[s] time-limit. COUNT:1	COSMOS が設定値をファイルへ書き込み後、PC 側でファイル読み込み完了フラグを返さない。	BEARS 回転の PC が正常動作しているかどうかを状態確認する。
	RXR : ERR Local error end(trk_30). COUNT:1	大気差補正エラー 天体が沈んでいるか、その時取得した気象パラメータが異常	OBSTABLE(sorce table)で、昇っている天体を選んでいるか、また気象パラメータに問題がないか確認
	RXR : ERR The reach of <SOFT-LIMIT> angle. (143.221850) COUNT:1	受信機回転角がソフトリミットに達した	OBSTABLE(device table)での受信機回転角の初期値を変更する。
多	RXT : ERR FLAG [RXT] Setting Time out. COUNT:1	RXT のセッティングで、タイムアウトした	通常は気にしなくて良い。頻発するときは、対象となる受信機調整の PC の状態確認
たまに発生	SYNTHE_A : ERR GPIB: Not-Remote. COUNT:1	シンセサイザ機器 (SYNTHE_A: 4 台あるうちの1台目) がリモート制御状態になっていない	望遠鏡下部機器室でシンセサイザの確認

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Revised January 18, 2011 by T. Yonezu (NRO)

If you have comments and questions on this manual, please contact [S. Takano](#) (Room 203, or [stakano @ nro.nao.ac.jp](mailto:stakano@nro.nao.ac.jp)).
