

VLA Observation Preparation



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Accessing the OPT and its Suite of Tools

Register at

<https://my.nrao.edu>

For this event, login to

<https://opt-extra-3.aoc.nrao.edu/opt>

- This is a special version of the OPT for this Community Days event.
- Do not use this link to prepare and submit VLA observations.

Observational Considerations

The VLA primarily uses dynamic scheduling, therefore it is difficult to know at what exact time your project will be observed.

- Each scheduling block (SB) must include a range of scheduling constraints:
 - LST start range
 - Weather
 - wind
 - atmospheric phase limit (APL)
- Anticipate:
 - Unknown position of the antennas at the start
 - overhead of start-up slew time
 - cable wrap request
 - Availability of calibrators/slew for different starting times

Observational Considerations

- Where are my calibrators and target sources on the sky?
- Strong, point-like calibrators are good for bandpass and delay calibration.
- Nearby calibrators are good for complex gain calibration (amplitude and phase).
- Reference pointing calibrators should be in the same general region of the sky.
- What are the choices for a flux density calibrator?
- Can certain calibrations be combined with fewer calibrator sources, i.e., use the flux density calibrator as the bandpass calibrator?

Designing a Scheduling Block (SB)

- Determine which/what
 - Sources to observe, and for how long (with each resource)
 - Resources (Instrument Configurations):
 - For Continuum
 - For Spectral Line
 - Calibrations to perform:
 - Reference Pointing (mainly for high frequency)
 - Flux Density Scale
 - Delay
 - Bandpass
 - Complex Gain (amplitude and phase)
 - Polarization (when applicable)

What are we observing?

- Target source: the AGB star IRC+10216
 - RA (J2000) = 09h 47m 57.382s
 - DEC (J2000) = +13d 16' 40.66"
- D-configuration
- 3 hour long scheduling block
- Ka-band spectral line setup
 - HC3N ($\nu_0 = 36.39232$ GHz)
 - SiS ($\nu_0 = 36.30963$ GHz)
 - V (radio, LSR) = -26 km/s
 - $\Delta V \sim 35$ km/s

Differences to Note

The recommended reference pointing strategy since the observation of IRC+10216 in April 2010 has changed.

- The data taken for the IRC+10216 Spectral Line CASA tutorial used a C-band reference pointing resource.
- ⦿ X-band reference pointing is the recommended and preferred resource. This will slightly change the source selection and SB setup from the original dataset.

Workflow

Step 1

SCT
Source
Catalog Tool

- Catalog of proposed source(s) are created during import.
- Observer can add calibrators to this catalog for easier access during SB creation.

Step 2

RCT
Resource
Catalog Tool

- Observer creates a resource catalog of proposed instrument configuration(s).
- Create custom continuum or spectral line resources or save default resources to the catalog for easy access.

Step 3

OPT
Observation
Preparation Tool

- Project tree is created during import.
- SBs are created under a Program Block. The SBs contain scans which are defined by sources, resources, scan mode, and scan intents.

Interactive Slides

Interactive slides will be denoted with color bars at the top of the slide.



Interactive



Interactive



Interactive

Step 1 Source Catalog Tool

- Starting **with** a pre-made Source Catalog:
 - Verify the science target positions were imported correctly.
- Starting **without** a pre-made Source Catalog:
 - Create a new Catalog and add the science target(s).
- In both cases, may add the appropriate calibrators to the catalog:
 - complex gain, flux density, bandpass, delay, reference pointing, etc.

Login to the Observation Preparation Tool

NRAO National Radio Astronomy Observatory

Dashboard Proposals Data Processing **Obs Prep** Helpdesk Profile

Hi, Galacticco | Sign Out

Thursday 24 January 2013

Options

- Obs Prep Tools
 - Information

Observation Preparation Tools

EVLA Observation Preparation Tool

- [Information about the Observation Preparation Tool](#)
- [Login to the Observation Preparation Tool](#)

GBT Dynamic Scheduling System

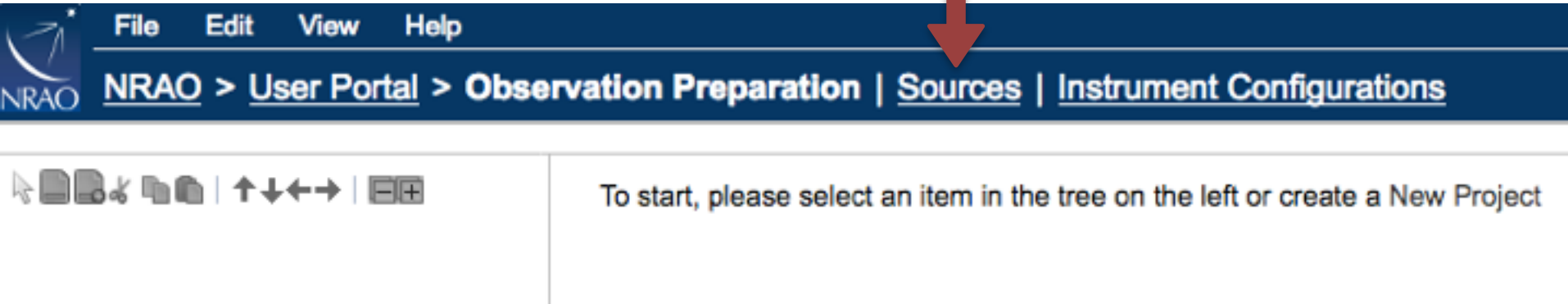
- [Information about the Dynamic Scheduling System](#)
- [Login to the Dynamic Scheduling System](#)



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Step 1 Accessing the Source Catalog Tool

In the OPT: click on Sources



The screenshot shows the top navigation bar of the NRAO User Portal. The menu items are File, Edit, View, and Help. Below the menu is a breadcrumb trail: NRAO > User Portal > Observation Preparation | Sources | Instrument Configurations. A red arrow points to the 'Sources' link. Below the navigation bar is a toolbar with icons for file operations (copy, paste, delete, etc.) and a main content area with the text: 'To start, please select an item in the tree on the left or create a New Project'.

Step 1 Create a Source Catalog

File → Create New → Catalog

1

File Edit Help

Create New 2

Catalog 3

Group

Source

Export XML...
Export PST...
Import...
Exit

Search Aliases As Well

External Search

Advanced Search

Advanced Search

VLA

Personal Catalog

To start, please select an item in the tree on the left or create a New Catalog

Step 1 Edit the New Source Catalog

File Edit Help

NRAO > User Portal > Observation Preparation | Sources | Instrument Configurations

Sources Properties

CATALOG PROPERTIES

NAME: Demo **Provide a name for the catalog**

To add a personal note, click 'New Note' below.

(New Note)

CATALOG OWNER

CURRENT COAUTHORS
No CoAuthors Found

ADD COAUTHORS

Last Name: Search

Name	E-mail
Add Coauthors	

**Share the catalog
with co-authors**

Step 1**Create a Source in the Source Catalog****File → Create New → Source**

The screenshot shows the NRAO Source Catalog software interface. The 'File' menu is open, and the 'Create New' option is selected. The 'Source' option is highlighted in the 'Create New' submenu. The 'Demo' catalog is selected in the left sidebar. The 'CATALOG PROPERTIES' dialog box is open, showing the 'NAME' field set to 'Demo'.

1

2

3

File Edit Help

Create New Catalog
Group
Source

Export XML...
Export PST...
Import...
Exit

Sources Properties

CATALOG PROPERTIES

NAME: Demo

To add a personal note, click 'New Note' below.

(New Note)

VLA
Personal Catalog
Demo

Select the Catalog you will be creating the source in.

Step 1 Edit the Source Name and J2000 Position

Return to 'Demo'

IRC+10216 Images Notes

SOURCE NAME(S)

NAME

ORIGIN OF INFORMATION

ALIASES [Click to View](#)

SOURCE MAP [Open in New Window](#)

SOURCE POSITIONS

POSITION TYPE:

Equatorial

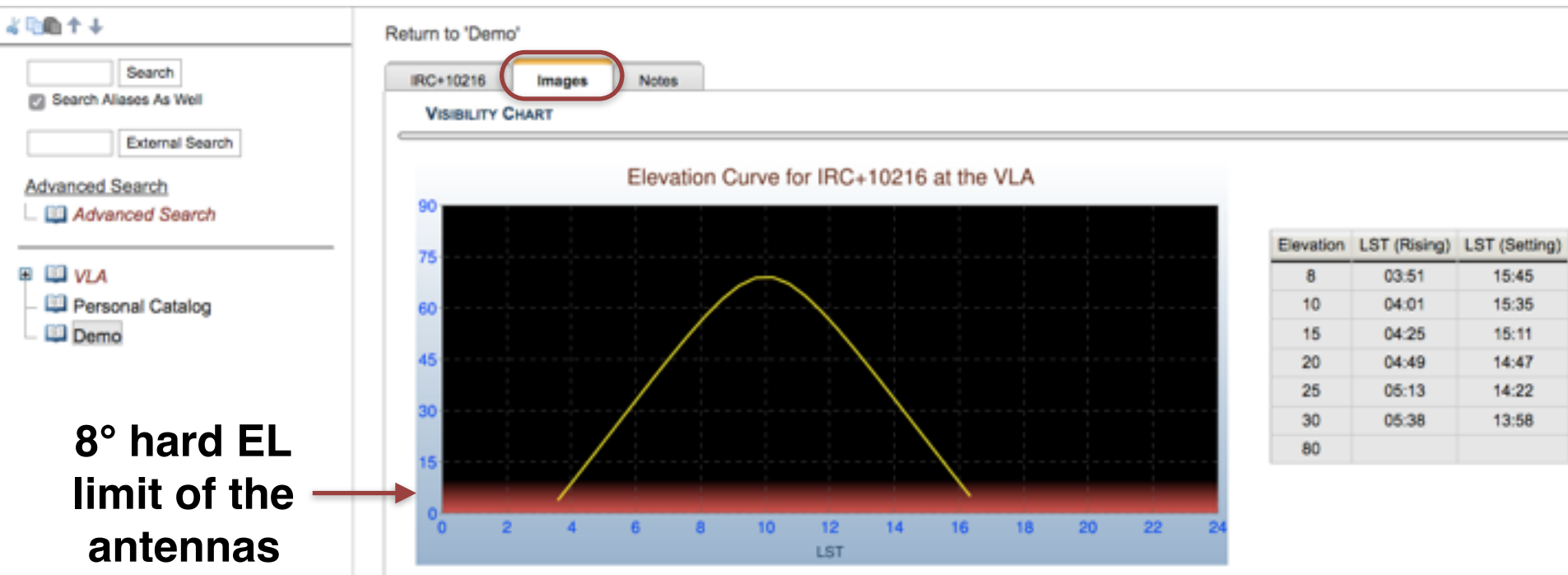
	VALUE	UNCERTAINTY
RIGHT ASCENSION	<input type="text" value="9h 47m 57.382s"/>	<input type="text" value="0.00mas"/>
DECLINATION	<input type="text" value="13d 16' 40.66"/>	<input type="text" value="0.00mas"/>
DISTANCE	<input type="text" value="0.0"/> km <input type="text"/>	<input type="text" value="0.0km"/>
EQUINOX	<input type="text" value="J2000"/>	

Target source:
IRC+10216

RA (J2000)
09:47:57.382

DEC (J2000)
+13:16:40.66

Step 1 Source LST range at the VLA



8° hard EL
limit of the
antennas

05:40–13:50 LST

$30^\circ < EL < 80^\circ$

**(EL limits recommended for high frequency observing
in D-configuration to avoid antenna shadowing)**

Step 1

Determine & Select Calibrators

Target source: IRC+10216

RA (J2000): 09h 47m 57.382s

DEC (J2000): +13d 16' 40.66"

LST range: 05:40–13:50

- What calibrators are needed?
 - Complex Gain (amplitude and phase)
 - Flux Density Scale
 - Bandpass
 - Delay
 - Reference Pointing in X-band (within 10°)

Step 1 Finding a Complex Gain Calibrator

Search
 Search Aliases As Well
 External Search
[Advanced Search](#)
 [Advanced Search](#)


VLA
 Personal Catalog
 Demo

Select the Catalog to view the source list.

Sources Properties

SOURCES IN 'DEMO' (1)

Select: All | None Show: 25 | 50 | 100 | 200 SELECT COORDINATE SYSTEM: Equatorial

	Name	Right Ascension	Declination	Flux / Structure	Sky Map
<input type="checkbox"/>	IRC+10216	9h 47m 57.382s	13d 16' 40.66"	DETAILS ALIASES	

Click on the Sky Map icon for a Bullseye view of the nearby calibrators.

Step 1 Finding a Complex Gain Calibrator (Bullseye view)

J0954+1743 is appropriate for both complex gain and reference pointing (X-band flux density is $\geq 0.3\text{Jy}$)



J0954+1743

Aliases: 0954+177 B0952+1757 0952+179

Positions:

RA: 9h 54m 56.824s
Dec: 17° 43' 31.222"

Uncertainties (mas):

RA: 2.0
Dec: 2.0

Flux / Structure

Band	Flux	A	B	C	D	UV _{min} (kλ)	UV _{max} (kλ)
L (20.0cm)	1.1Jy	P	X	X	X	45.0	
C (5.0cm)	0.7Jy	S	S	S	X	20.0	
X (3.0cm)	0.61Jy	P	P	P	P		
Ku (2.0cm)	0.6Jy	S	S	S	S		
Q (0.7cm)	0.4Jy	W	W	W	W		

Velocities:

No Information

Images:

None

Step 1 Advanced Search: Cone Search

Enter target source coordinates (09:47:57.382, 13:16:40.66) to search for an appropriate phase calibrator.

1 **Advanced Search**

Select a catalog to search
 Search Aliases As Well

2 **VLA** Personal Catalog Demo

3 **Cone Search**

4 Center RA: 9h 47m 57.382s

5 Center Dec: 13d 16' 40.66"

6 Radius (deg.): 50.0d

7 **Search**

Select **VLA**, to access the calibrator catalog.

SEARCH PARAMETERS:

Search By Calibrator Code

Array Conf. Any

In Band Any

Code P+S+W

Search By Flux Density

>=

In Band Any

Search By Name

*

Search Aliases as well?

Search By Right Ascension (J2000)

>=

<=

Search By Declination (J2000)

>=

<=

Step 1 Cone Search Results

Sources Properties

SOURCES IN '1. SEARCH RESULTS' (439)

Select: All | None Show: 25 | 50 | 100 | 200 SELECT COORDINATE SYSTEM: Equatorial

K << < 1 2 3 4 5 6 7 8 9 10 > >> > 										
	Catalog	Name	Distance	Right Ascension	Declination	Flux / Structure				Sky Map
<input type="checkbox"/>	Demo	IRC+10216	0.0d	9h 47m 57.382s	13d 16' 40.66"	DETAILS	ALIASES			
<input type="checkbox"/>	VLA	J0946+1017	3.01d	9h 46m 35.0693s	10d 17' 6.126"	DETAILS	ALIASES			
<input type="checkbox"/>	VLA	J1002+1216	3.78d	10h 2m 52.845171s	12d 16' 14.58706"	DETAILS	ALIASES			
<input type="checkbox"/>	VLA	J0943+1702	3.93d	9h 43m 17.2243s	17d 2' 18.969"	DETAILS	ALIASES			
<input type="checkbox"/>	VLA	J0931+1414	4.21d	9h 31m 5.3424s	14d 14' 16.522"	DETAILS	ALIASES			
<input type="checkbox"/>	VLA	J0953+1720	4.32d	9h 53m 59.2316s	17d 20' 56.669"	DETAILS	ALIASES			
<input type="checkbox"/>	VLA	J1001+1015	4.56d	10h 1m 57.734964s	10d 15' 49.70441"	DETAILS	ALIASES			
<input type="checkbox"/>	VLA	J0949+1752	4.62d	9h 49m 39.7627s	17d 52' 49.422"	DETAILS	ALIASES			
<input type="checkbox"/>	VLA	J0954+1743	4.76d	9h 54m 56.823626s	17d 43' 31.22242"	DETAILS	ALIASES			
<input type="checkbox"/>	VLA	J1007+1356	4.84d	10h 7m 41.498079s	13d 56' 29.60094"	DETAILS	ALIASES			
<input type="checkbox"/>	VLA	J0935+0915	5.09d	9h 35m 13.6411s	9d 15' 7.813"	DETAILS	ALIASES			

Hover mouse over **Details** for Flux / Structure information.

Band	Flux	A	B	C	D
L (20.0cm)	1.1Jy	P	X	X	X
C (5.0cm)	0.7Jy	S	S	S	X
X (3.0cm)	0.61Jy	P	P	P	P
Ku (2.0cm)	0.6Jy	S	S	S	S
Q (0.7cm)	0.4Jy	W	W	W	W

Step 1 Copy Calibrator from VLA Catalog

Edit → Copy → Sources

The screenshot shows the NRAO web interface. The 'Edit' menu is open, with 'Copy' and 'Sources' options highlighted. The main content area displays a table of search results for sources in the VLA catalog. The table has columns for Catalog, Name, Distance, Right Ascension, Declination, Flux / Structure, and Sky Map. The first row is selected, and the 'Sources' option is highlighted in the menu.

SOURCES IN '1. SEARCH RESULTS' (439)

Select: All | None Show: 25 | 50 | 100 | 200 SELECT COORDINATE SYSTEM: Equatorial

	Catalog	Name	Distance	Right Ascension	Declination	Flux / Structure	ALIASES	Sky Map
<input type="checkbox"/>	Demo	IRC+10216	0.0d	9h 47m 57.382s	13d 16' 40.66"	DETAILS	ALIASES	
<input type="checkbox"/>	VLA	J0946+1017	3.01d	9h 46m 35.0693s	10d 17' 6.126"	DETAILS	ALIASES	
<input type="checkbox"/>	VLA	J1002+1216	3.78d	10h 2m 52.845171s	12d 16' 14.58706"	DETAILS	ALIASES	
<input type="checkbox"/>	VLA	J0943+1702	3.93d	9h 43m 17.2243s	17d 2' 18.969"	DETAILS	ALIASES	
<input type="checkbox"/>	VLA	J0931+1414	4.21d	9h 31m 5.3424s	14d 14' 16.522"	DETAILS	ALIASES	
<input type="checkbox"/>	VLA	J0953+1720	4.32d	9h 53m 59.2316s	17d 20' 56.669"	DETAILS	ALIASES	
<input type="checkbox"/>	VLA	J1001+1015	4.56d	10h 1m 57.734964s	10d 15' 49.70441"	DETAILS	ALIASES	
<input type="checkbox"/>	VLA	J0949+1752	4.62d	9h 49m 39.7627s	17d 52' 49.422"	DETAILS	ALIASES	
<input checked="" type="checkbox"/>	VLA	J0954+1743	4.76d	9h 54m 56.823626s	17d 43' 31.22242"	DETAILS	ALIASES	

Step 1 Paste Calibrator to Your Source Catalog

Edit → Paste → Sources

The screenshot shows the NRAO web interface. The 'Edit' menu is open, and 'Paste' is selected. The 'Sources' catalog is displayed, showing a table of sources. The table has columns for Name, Right Ascension, Declination, Flux / Structure, and Sky Map. Two sources are listed: IRC+10216 and J0954+1743. The 'Demo' link in the left sidebar is circled with a red '1'.

2

3

4

1

	Name	Right Ascension	Declination	Flux / Structure	Sky Map
<input type="checkbox"/>	IRC+10216	9h 47m 57.382s	13d 16' 40.66"	DETAILS ALIASES	
<input type="checkbox"/>	J0954+1743	9h 54m 56.823626s	17d 43' 31.22242"	DETAILS ALIASES	

These copy/paste steps can be used for other calibrators.

Step 1 Advanced Search for Bandpass Calibrator

Search By Flux Density

File Edit Help
 NRAO > User Portal > Observation Preparation | Sources | Instrument Configurations

SEARCH

Select a catalog to search
 Search Aliases As Well

External Search

Advanced Search
 Advanced Search
 1. Search Results 1

VLA
 Personal Catalog
 Demo

SOURCE SEARCH [Hide Advanced](#)

Select: All | None
 2 VLA Personal Catalog Demo

SEARCH PARAMETERS:

Cone Search

Center RA	9h 47m 57.382s
Center Dec	13d 16' 40.66"
Select Source	
Radius (deg.)	50.0d

Search By Calibrator Code

Array Conf. Any

In Band Any

Code P+S+W

3 Search By Flux Density

>= 10.0Jy ← 4

In Band Ka ← 5

Search By Name

•

Search Aliases as well?

6 Search

Search By Right Ascension (J2000)

>=

<=

Search By Declination (J2000)

>=

<=

Keep Cone Search selected with target source coordinates entered and a 50d search radius.

Step 1 Bandpass Calibration Search Results

J1229+0203 is a good bandpass and delay calibrator candidate, but not appropriate for X-band reference pointing.

Sources Properties

SOURCES IN '1. SEARCH RESULTS' (2)

Select: All | None Show: 25 | 50 | 100 | 200 SELECT COORDINATE SYSTEM: Equatorial

		Catalog	Name	Distance	Right Ascension	Declination	Flux / Structure		Sky Map
<input type="checkbox"/>		VLA	J1230+1223	39.67d	12h 30m 49.423381s	12d 23' 28.04393"	DETAILS	ALIASES	
<input type="checkbox"/>		VLA	J1229+0203	41.4d	12h 29m 6.699729s	2d 3' 8.59819"	DETAILS	ALIASES	

Band	Flux	A	B	C	D
L (20.0cm)	32Jy	X	X	X	X
C (5.0cm)	30Jy	S	X	X	X
X (3.0cm)	27.5Jy	S	S	X	X
Ku (2.0cm)	34Jy	S	S	S	X
Q (0.7cm)	13.5Jy	S	S	S	S

Click on icon for source information.

Step 1 Images Tab: Check LST Range

**J1229+0203 LST range falls within the LST range of IRC+10216.
08:55–16:00 LST ($30^\circ < EL < 80^\circ$)**

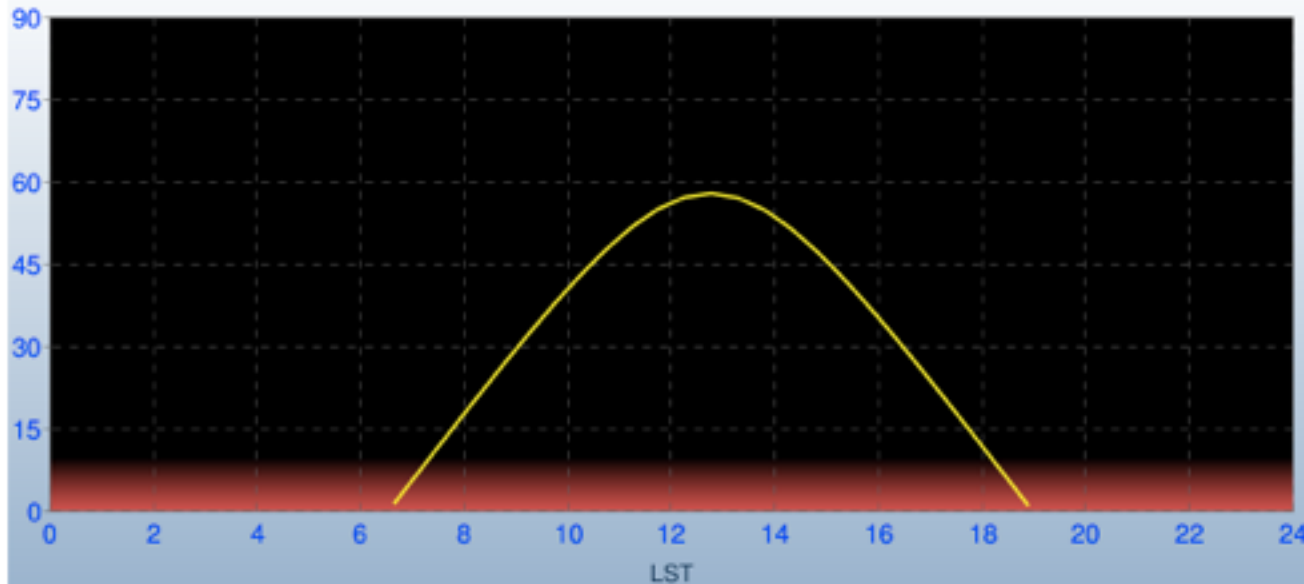
J1229+0203

Images

Notes

VISIBILITY CHART

Elevation Curve for J1229+0203 at the VLA

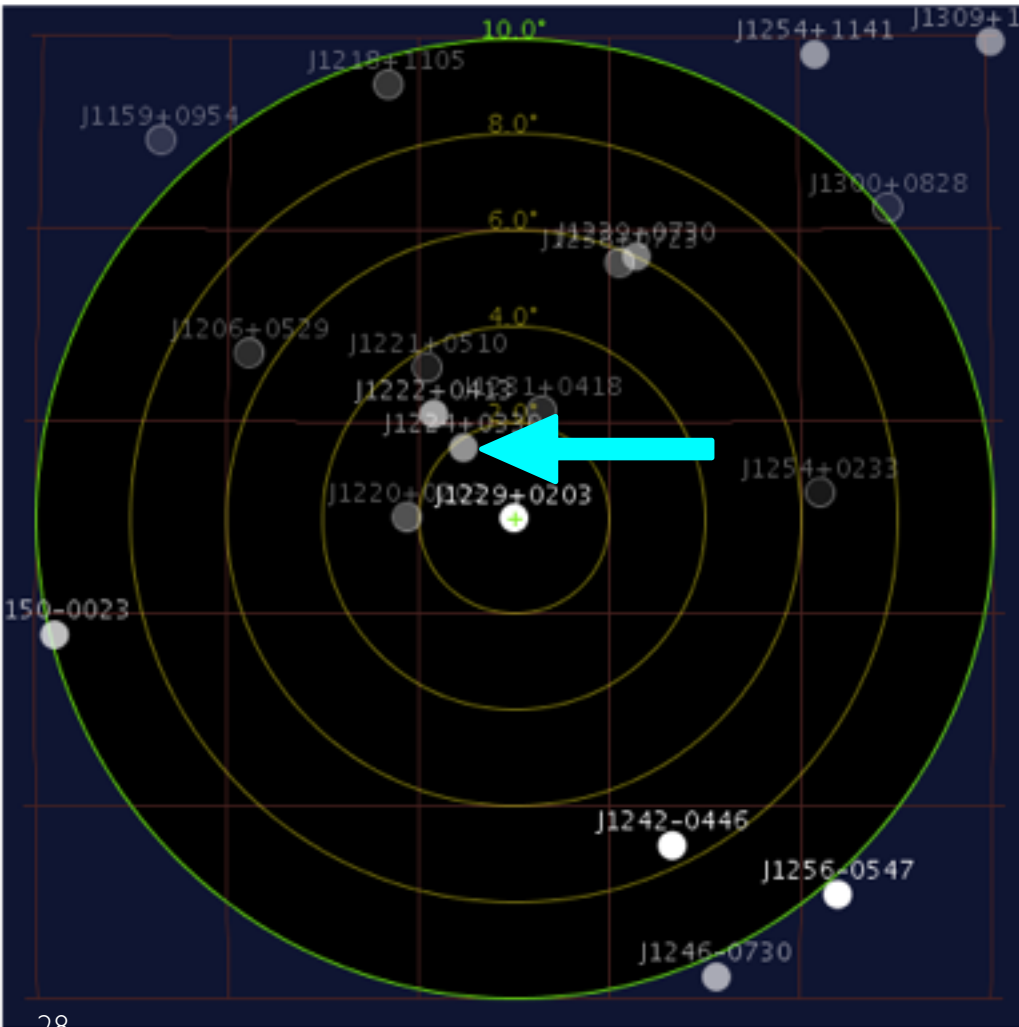


Elevation	LST (Rising)	LST (Setting)
8	07:02	17:56
10	07:12	17:46
15	07:36	17:22
20	08:01	16:58
25	08:26	16:33
30	08:51	16:07
80		

Step 1

Bandpass/Delay Cal Reference Pointing

J1224+0330 is an appropriate X-band reference pointing source for J1229+0203.



J1224+0330

Aliases: 1224+035 B1222+0347 1222+037

Positions:

RA: 12h 24m 52.422s

Dec: 3° 30' 50.293"

Uncertainties (mas):

RA: 10.0

Dec: 10.0

Flux / Structure

Band	Flux	A	B	C	D	UV _{min} (kλ)	UV _{max} (kλ)
L (20.0cm)	1.1Jy	S	S	S	X	6.0	
C (5.0cm)	1Jy	P	P	P	P		
X (3.0cm)	1.04Jy	P	P	P	P		
Ku (2.0cm)	1.1Jy	P	P	P	P		
Q (0.7cm)	0.8Jy	S	S	S	S		

Velocities:

No Information

Images:

[1224+035.1.png](#)

[1224+035.uv.png](#)

Step 1 Choose a Flux Density Calibrator

Choose from one of the standard VLA flux density scale calibrators.
3C286 and 3C48 are recommended for high frequency observing

Search

Search Aliases As Well

External Search

Advanced Search

- Advanced Search
- 1. Search Results

- VLA ← 1
- RA Groups
- Dec Groups
- VLA Flux Cal ← 2
- Personal Catalog
- Demo

Sources Properties

SOURCES IN 'VLA FLUX CAL' (10)

Select: All | None Show: 25 | 50 | 100 | 200 SELECT COORDINATE SYSTEM: Equatorial

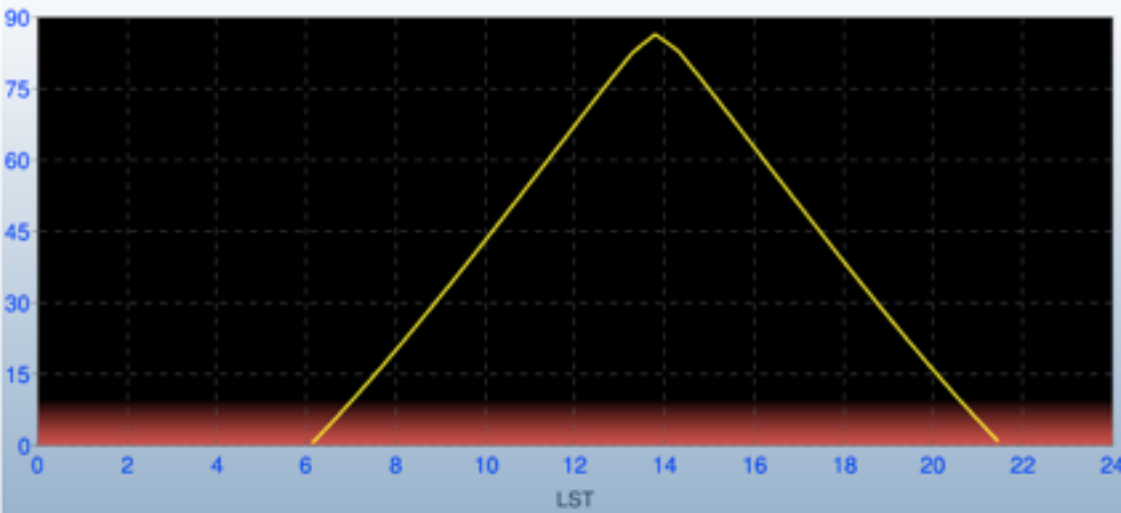
	Name	Right Ascension	Declination	Flux / Structure	ALIASES	Sky Map
<input type="checkbox"/>	0137+331=3C48	1h 37m 41.299431s	33d 9' 35.13299"	DETAILS	ALIASES	
<input type="checkbox"/>	0542+498=3C147	5h 42m 36.137916s	49d 51' 7.23356"	DETAILS	ALIASES	
<input type="checkbox"/>	0521+166=3C138	5h 21m 9.886021s	16d 38' 22.05122"	DETAILS	ALIASES	
<input type="checkbox"/>	1331+305=3C286	13h 31m 8.287984s	30d 30' 32.95885"	DETAILS	ALIASES	
<input type="checkbox"/>	1411+522=3C295	14h 11m 20.6477s	52d 12' 9.141"	DETAILS	ALIASES	
<input type="checkbox"/>	3C48	1h 37m 41.299431s	33d 9' 35.13299"	DETAILS	ALIASES	
<input type="checkbox"/>	3C147	5h 42m 36.137916s	49d 51' 7.23356"	DETAILS	ALIASES	
<input type="checkbox"/>	3C138	5h 21m 9.886021s	16d 38' 22.05122"	DETAILS	ALIASES	
<input type="checkbox"/>	3C286	13h 31m 8.287984s	30d 30' 32.95885"	DETAILS	ALIASES	
<input type="checkbox"/>	3C295	14h 11m 20.6477s	52d 12' 9.141"	DETAILS	ALIASES	

Step 1 Choose a Flux Density Calibrator

IRC+10216

LST range: 05:40–13:50

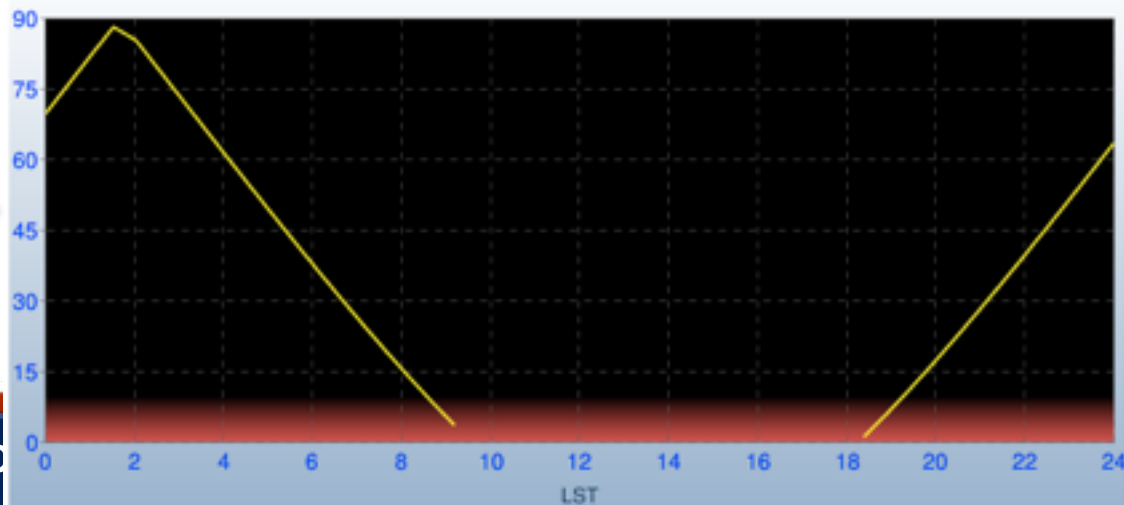
Elevation Curve for 1331+305=3C286 at the VLA



3C286 LST range:
08:40–12:45 or 14:15–18:25
($30^\circ < EL < 80^\circ$)

3C48 LST range:
20:45–00:50 or 02:30–06:30
($30^\circ < EL < 80^\circ$)

Elevation Curve for 0137+331=3C48 at the VLA



Step 1 Source Catalog is Complete

- IRC+10216 → Science Target
- J0954+1743 → Complex Gain Calibrator (plus reference pointing)
- J1229+0203 → Bandpass & Delay Calibrator
- J1224+0330 → Reference Pointing Calibrator for Bandpass/Delay
- 3C286 → Flux Density Scale Calibrator (plus reference pointing)

Sources Properties

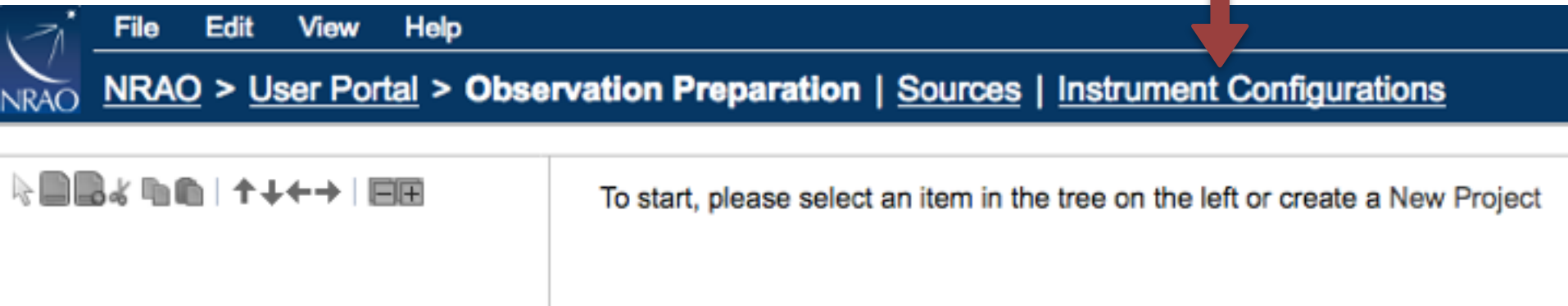
SOURCES IN 'DEMO' (5)

Select: All | None Show: 25 | 50 | 100 | 200 SELECT COORDINATE SYSTEM: Equatorial

		Name	Right Ascension	Declination	Flux / Structure	ALIASES	Sky Map
<input type="checkbox"/>		IRC+10216	9h 47m 57.382s	13d 16' 40.66"	DETAILS	ALIASES	
<input type="checkbox"/>		J0954+1743	9h 54m 56.823626s	17d 43' 31.22242"	DETAILS	ALIASES	
<input type="checkbox"/>		J1229+0203	12h 29m 6.699729s	2d 3' 8.59819"	DETAILS	ALIASES	
<input type="checkbox"/>		J1224+0330	12h 24m 52.421938s	3d 30' 50.29291"	DETAILS	ALIASES	
<input type="checkbox"/>		1331+305=3C286	13h 31m 8.287984s	30d 30' 32.95885"	DETAILS	ALIASES	

Step 2 Accessing the Resource Catalog Tool

In the OPT: click on Instrument Configurations



The screenshot shows the top navigation bar of the NRAO User Portal. The menu items are File, Edit, View, and Help. Below the menu, the breadcrumb trail reads: NRAO > User Portal > Observation Preparation | Sources | Instrument Configurations. A red arrow points to the 'Instrument Configurations' link. Below the navigation bar, there is a toolbar with icons for file operations and a main content area with the text: 'To start, please select an item in the tree on the left or create a New Project'.

Step 2 Create a Resource Catalog

File → Create New → Catalog

1

File Edit Help

Create New 2

Catalog 3

Group

8-bit Instrument Configurati

3-bit Instrument Configurati

Resources Properties

Name: Demo provide a name

CATALOG OWNER

CURRENT COAUTHORS
No CoAuthors Found

ADD COAUTHORS

Last Name: Search

Name	E-mail
<input type="button" value="Add Coauthors"/>	

Share the catalog with co-authors

Step 2 Resource to be Created

Ka-band 8-bit instrument configuration

- Spectral Lines
 - HC3N ($\nu_0 = 36.39232$ GHz)
 - SiS ($\nu_0 = 36.30963$ GHz)
 - V (radio, LSR) = -26 km/s
 - $\Delta V \sim 35$ km/s

Step 2 Create a Resource in the Catalog

File → Create New → 8-bit Instrument Configuration

1

2

3

The screenshot shows the NRAO software interface. The 'File' menu is open, and 'Create New' is selected. The '8-bit Instrument Configuration' option is highlighted. The main window displays a frequency spectrum plot from 17.7 GHz to 26.8 GHz with two highlighted bands (green and orange). Below the plot are configuration tabs (Basics, Lines, Basebands, Line Placement, Subbands, Validation) and a form for creating a new resource.

Total BL BPs Used:	0 of 64
Total Data Rate:	0.00 MB/s or 0.00 GB/h
Total Spectral Points:	0
Total Bandwidth:	0.0GHz
Capability Mode:	General observing

Basics | Lines | Basebands | Line Placement | Subbands | Validation

ID
2562995

Name
[New Resource]

Receiver Band
K (18.0GHz - 26.5GHz)
3-dB range: 17.7GHz - 26.8GHz

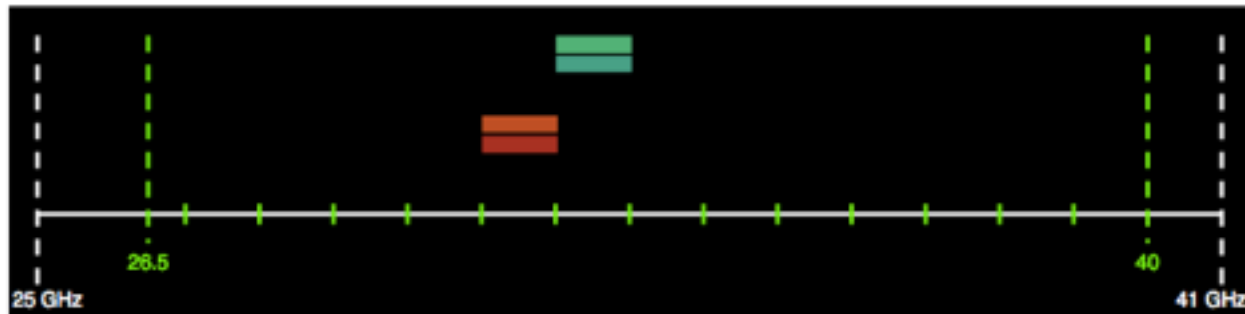
Correlator Integration Time (s)
3.0

Comments

Default view of an 8-bit instrument configuration.

Step 2 Basics Tab

Demo » Ka-band demo



Total BI. BPs Used:	0 of 64
Total Data Rate:	0.00 MB/s or 0.00 GB/h
Total Spectral Points:	0
Total Bandwidth:	0.0GHz
Capability Mode:	General observing

Basics

Lines

Basebands

Line Placement

Subbands

Validation

ID

2517977

Name

Ka-band demo

← provide a name

Receiver Band

Ka (26.5GHz - 40.0GHz)

← select receiver band: Ka (26.5GHz - 40.0GHz)

1-dB range: 26.0GHz - 40.0GHz

3-dB range: 25.0GHz - 41.0GHz

Correlator Integration Time (s)

3.0

← adjust the correlator integration time according to array configuration (3 sec for D-config)

Comments

Step 2 Create a Spectral Line Resource

- 1. Lines Tab:** Enter source position and line setup.
 - HC3N ($\nu_0 = 36.39232$ GHz, V (radio, LSR) = -26 km/s, $\Delta V \sim 35$ km/s)
 - SiS ($\nu_0 = 36.30963$ GHz, V (radio, LSR) = -26 km/s, $\Delta V \sim 35$ km/s)
- 2. Basebands Tab:** Adjust the baseband center frequencies as needed and turn on the Doppler Line setting.
- 3. Line Placement Tab:** Generate the lines within the basebands.
- 4. Subbands Tab:** Check the location of the lines to see where they fall relative to the 128 MHz boundaries (should be > 6 MHz from them).
- 5. Validation Tab:** Check for errors and warnings.

Once we import the resource into an SB within the OPT, we will then be able to double check the center frequency calculations using the Dopset tool.

Step 2 Lines Tab

Enter source position
09:47:57.382, 13:16:40.66

Basics **Lines** Basebands Line Placement Subbands Validation

Direction for Doppler calculations

Coordinate System	Right Ascension	Declination	Epoch
Equatorial	9h 47m 57.382s	13d 16' 40.66"	J2000

Import Source Position

← Enter science target source coordinates.

Step 2 Lines Tab

Enter spectral line information

HC3N ($\nu_0 = 36.39232$ GHz)

SiS ($\nu_0 = 36.30963$ GHz)

V (radio, LSR) = -26 km/s

$\Delta V \sim 35$ km/s

Spectral line frequencies and coverage

	Line	Rest Frequency	Rest Frame	Convention	Velocity	Minimum Range	Channel Separation	Polarization	Use Recirculation?	Bl.BPs Required	Delete
L1	HC3N	36.39232 36.396GHz	LSR	Radio (km/s)	-26.0 km/s	35.0 km/s 4.249MHz	2.0 km/s 242.783kHz	Full	<input checked="" type="checkbox"/>	1	

Add Line Copy Last Line Download Spectral Lines Import Spectral Lines...



Add Line

Step 2 Lines Tab

Enter spectral line information

HC3N ($\nu_0 = 36.39232$ GHz)

SiS ($\nu_0 = 36.30963$ GHz)

V (radio, LSR) = -26 km/s

$\Delta V \sim 35$ km/s

Spectral line frequencies and coverage

	Line	Rest Frequency	Rest Frame	Convention	Velocity	Minimum Range	Channel Separation	Polarization	Use Recirculation?	BI.BPs Required	Delete
L1	HC3N	36.39232 36.396GHz	LSR	Radio (km/s)	-26.0 km/s	35.0 km/s 4.249MHz	2.0 km/s 242.783kHz	Full	<input checked="" type="checkbox"/>	1	
L2	SiS	36.30963 36.313GHz	LSR	Radio (km/s)	-26.0 km/s	35.0 km/s 4.239MHz	2.0 km/s 242.232kHz	Full	<input checked="" type="checkbox"/>	1	

Add Line Copy Last Line Download Spectral Lines Import Spectral Lines...



Copy Last Line

Step 2 Lines Tab

Take note of these two calculated values:
36.396 GHz and **36.313 GHz**

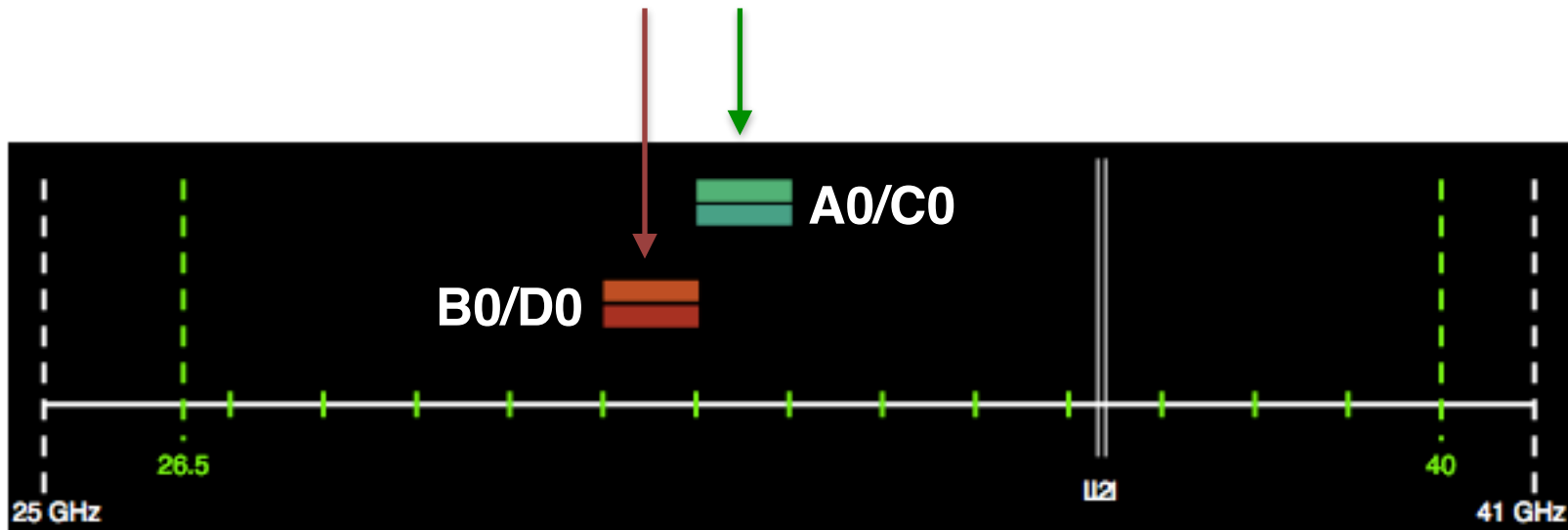
Spectral line frequencies and coverage

	Line	Rest Frequency	Rest Frame	Convention	Velocity	Minimum Range	Channel Separation	Polarization	Use Recirculation?	BI.BPs Required	Delete
L1	HC3N	36.39232 36.396GHz	LSR	Radio (km/s)	-26.0 km/s	35.0 km/s 4.249MHz	2.0 km/s 242.783kHz	Full	<input checked="" type="checkbox"/>	1	
L2	SIS	36.30963 36.313GHz	LSR	Radio (km/s)	-26.0 km/s	35.0 km/s 4.239MHz	2.0 km/s 242.232kHz	Full	<input checked="" type="checkbox"/>	1	

Add Line Copy Last Line Download Spectral Lines Import Spectral Lines...

Step 2 Ka-band Spectral Line Resource

The two 1 GHz wide basebands of the 8-bit samplers.



We need to adjust the baseband center frequencies so they overlap with the lines.

Step 2 Create a Spectral Line Resource

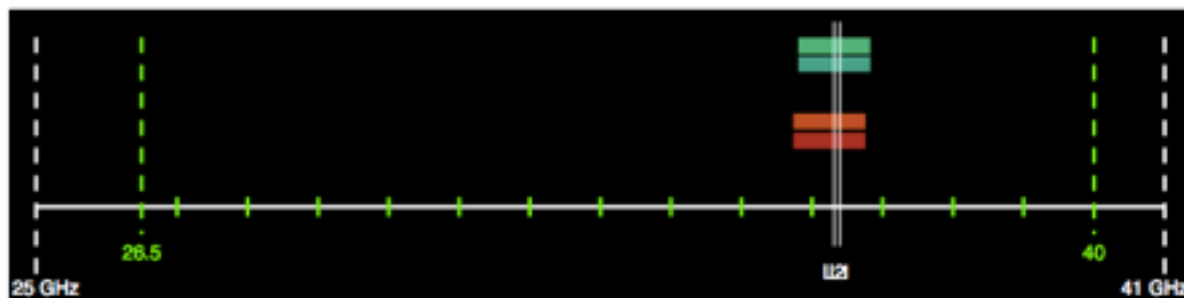
- 1. Lines Tab:** Enter source position and line setup.
 - HC3N ($\nu_0 = 36.39232$ GHz, V (radio, LSR) = -26 km/s, $\Delta V \sim 35$ km/s)
 - SiS ($\nu_0 = 36.30963$ GHz, V (radio, LSR) = -26 km/s, $\Delta V \sim 35$ km/s)
- 2. Basebands Tab:** Adjust the baseband center frequencies as needed and turn on the Doppler Line setting.
- 3. Line Placement Tab:** Generate the lines within the basebands.
- 4. Subbands Tab:** Check the location of the lines to see where they fall relative to the 128 MHz boundaries (should be > 6 MHz from them).
- 5. Validation Tab:** Check for errors and warnings.

Once we import the resource into an SB within the OPT, we will then be able to double check the center frequency calculations using the Dopset tool.

Step 2 Basebands Tab

Adjust baseband center frequencies and turn on the Doppler Line setting for HC3N in A0/C0 and SiS in B0/D0. (Ignore the error message at the bottom of the Basebands tab. It is generated because there are no subbands within the basebands.)

Demo » Ka-band demo



Total BI. BPs Used:	0 of 64
Total Data Rate:	0.00 MB/s or 0.00 GB/h
Total Spectral Points:	0
Total Bandwidth:	0.0GHz
Capability Mode:	General observing

Basics | Lines | **Basebands** | Line Placement | Subbands | Validation

Sampler Input Mode

Two 1-GHz 8-bit samplers (A0/C0 and B0/D0)

Name	Bits	Center Frequency	Sky Range
A0/C0 1.024GHz	8	36.32GHz	35.808GHz - 36.832GHz
B0/D0 1.024GHz	8	36.25GHz	35.738GHz - 36.762GHz

← A0/C0 adjust to 36.32 GHz

← B0/D0 adjust to 36.25 GHz

Name	Doppler Line	Offset From Center	Target Sky Frequency	Position	Velocity	Rest Frame	Convention
A0/C0	<input checked="" type="checkbox"/> HC3N - 36.392GHz	-75.521MHz	36.396GHz	9h 47m 57.382s 13d 16' 40.66"	-26.0km/s	Lsr Kinematic	Radio
B0/D0	<input checked="" type="checkbox"/> SiS - 36.310GHz	-62.824MHz	36.313GHz	9h 47m 57.382s 13d 16' 40.66"	-26.0km/s	Lsr Kinematic	Radio

Step 2 Create a Spectral Line Resource

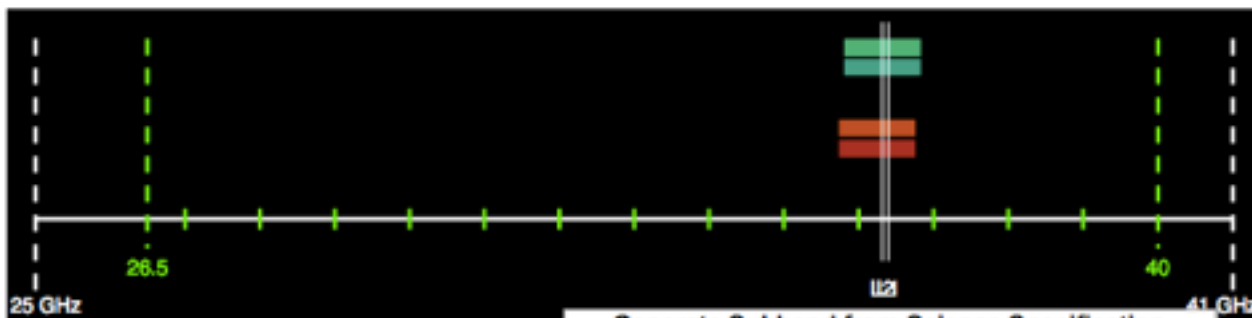
- 1. Lines Tab:** Enter source position and line setup.
 - HC3N ($\nu_0 = 36.39232$ GHz, V (radio, LSR) = -26 km/s, $\Delta V \sim 35$ km/s)
 - SiS ($\nu_0 = 36.30963$ GHz, V (radio, LSR) = -26 km/s, $\Delta V \sim 35$ km/s)
- 2. Basebands Tab:** Adjust the baseband center frequencies as needed and turn on the Doppler Line setting.
- 3. Line Placement Tab:** Generate the lines within the basebands.
- 4. Subbands Tab:** Check the location of the lines to see where they fall relative to the 128 MHz boundaries (should be > 6 MHz from them).
- 5. Validation Tab:** Check for errors and warnings.

Once we import the resource into an SB within the OPT, we will then be able to double check the center frequency calculations using the Dopset tool.

Step 2 Line Placement Tab

Generate the HC3N line within the A0/C0 baseband.

Demo » Ka-band demo



Total Bl. BPs Used:	0 of 64
Total Data Rate:	0.00 MB/s or 0.00 GB/h
Total Spectral Points:	0
Total Bandwidth:	0.0GHz
Capability Mode:	General observing

Line	Rest Frequency	Rest Frame	C
L1	HC3N 36.39232GHz 36.396GHz	Lsr Kinematic	F
L2	SiS 36.30963GHz 36.313GHz	Lsr Kinematic	F

Generate Subband from Science Specification

Using line HC3N - 36.39232GHz

Baseband
 ← 2

Comments
 Generated from HC3N - 36.39232GHz

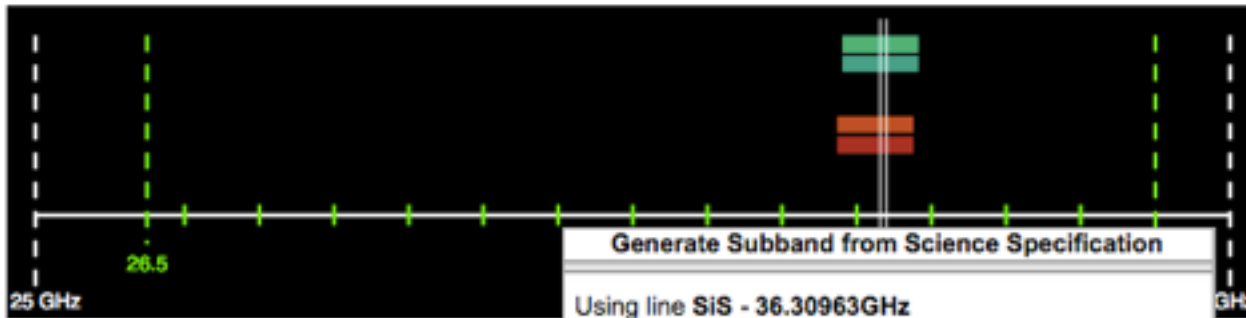
3

Use Recirculation?	Bl.BPs Required	Generate
Yes	1	<input type="button" value="Generate"/> 1
Yes	1	<input type="button" value="Generate"/>

Step 2 Line Placement Tab

Generate the SiS line within the B0/D0 baseband.

Demo » Ka-band demo



Total BI. BPs Used:	1 of 64
Total Data Rate:	0.25 MB/s or 0.89 GB/h
Total Spectral Points:	64
Total Bandwidth:	8.0MHz
Capability Mode:	General observing

Basics Lines Basebands Line Placement

Line	Rest Frequency	Rest Frame	C
L1	HC3N 36.39232GHz 36.396GHz	Lsr Kinematic	F
L2	SiS 36.30963GHz 36.313GHz	Lsr Kinematic	F

Generate Subband from Science Specification

Using line SiS - 36.30963GHz

Baseband
 B0/D0 ← 2

Comments
 Generated from SiS -
 36.30963GHz

3 Generate Cancel

Use Recirculation?	BI.BPs Required	Generate
Yes	1	Generate
Yes	1	1 Generate

Step 2 Create a Spectral Line Resource

- 1. Lines Tab:** Enter source position and line setup.
 - HC3N ($\nu_0 = 36.39232$ GHz, V (radio, LSR) = -26 km/s, $\Delta V \sim 35$ km/s)
 - SiS ($\nu_0 = 36.30963$ GHz, V (radio, LSR) = -26 km/s, $\Delta V \sim 35$ km/s)
- 2. Basebands Tab:** Adjust the baseband center frequencies as needed and turn on the Doppler Line setting.
- 3. Line Placement Tab:** Generate the lines within the basebands.
- 4. Subbands Tab:** Check the location of the lines to see where they fall relative to the 128 MHz boundaries (should be > 6 MHz from them).
- 5. Validation Tab:** Check for errors and warnings.

Once we import the resource into an SB within the OPT, we will then be able to double check the center frequency calculations using the Dopset tool.

Step 2 Subbands Tab

Check line placement within the subband (spectral window).

SBP	BW	Snap To Grid	Central Frequency	Fix To Baseband	Polarization	Bl. BPs	Recirculation	Channels	MB/s	Priority	Comments	Delete	Select All None
0	8MHz 65.9km/s	<input checked="" type="checkbox"/>	36.395521074G 36.39152GHz - 36.39952GHz	<input checked="" type="checkbox"/>	Full	1	1x	64 × 125kHz (64 × 1.03km/s)	0.247	Essential	Generated from HC3N	<input type="checkbox"/>	<input type="checkbox"/>

Avoid using **Snap To Grid** and **Fix To Baseband** when preparing spectral line observations.

Step 2 Subbands Tab

Check line placement within the subband (spectral window).

SBP	BW	Snap To Grid	Central Frequency	Fix To Baseband	Polarization	BL BPs	Recirculation	Channels	MB/s	Priority	Comments	Delete	Select All None
0	8MHz 66.0km/s	<input checked="" type="checkbox"/>	36.312823601G 36.30882GHz - 36.31682GHz	<input checked="" type="checkbox"/>	Full	1	1*	64 × 125kHz (64 × 1.03km/s)	0.247	Essential	Generated from SiS - 3f	<input type="checkbox"/>	<input type="checkbox"/>

Avoid using **Snap To Grid** and **Fix To Baseband** when preparing spectral line observations.

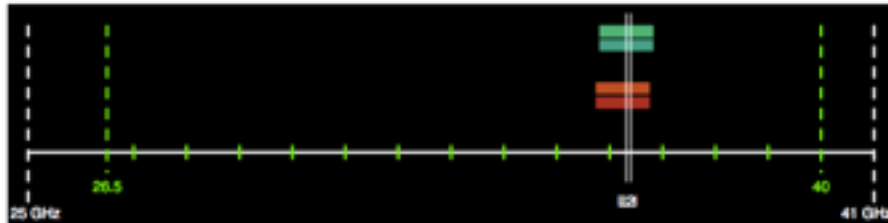
Step 2 Create a Spectral Line Resource

- 1. Lines Tab:** Enter source position and line setup.
 - HC3N ($\nu_0 = 36.39232$ GHz, V (radio, LSR) = -26 km/s, $\Delta V \sim 35$ km/s)
 - SiS ($\nu_0 = 36.30963$ GHz, V (radio, LSR) = -26 km/s, $\Delta V \sim 35$ km/s)
- 2. Basebands Tab:** Adjust the baseband center frequencies as needed and turn on the Doppler Line setting.
- 3. Line Placement Tab:** Generate the lines within the basebands.
- 4. Subbands Tab:** Check the location of the lines to see where they fall relative to the 128 MHz boundaries (should be > 6 MHz from them).
- 5. Validation Tab:** Check for errors and warnings.

Once we import the resource into an SB within the OPT, we will then be able to double check the center frequency calculations using the Dopset tool.

Step 2 Validation Tab

Check for errors and warnings.



Total Bl. BPs Used:	2 of 64
Total Data Rate:	0.49 MB/s or 1.78 GB/h
Total Spectral Points:	128
Total Bandwidth:	16.0MHz
Capability Mode:	General observing

- Basics
- Lines
- Basebands
- Line Placement
- Subbands
- Validation**

Name: Ka-band demo
 Tint: 3.0
 Receiver Band: Ka (26.5GHz - 40.0GHz)

T _{int}	AC BB _{center} Freq	AC Summed BW	AC Coverage	Req. BIBPs	# Channels	AC Doppler Line	AC Doppler Vel.	AC Doppler Pos.	AC Doppler Off.	Data Rate
Band	BD BB _{center} Freq	BD Summed BW	BD Coverage	Act. BIBPs	Min/Max Width	BD Doppler Line	BD Doppler Vel.	BD Doppler Pos.	BD Doppler Off.	
3s	36.32GHz	8.0MHz	0.78125 %	2	128	36.39232GHz	-26.0km/s LSR Radio	9h 47m 57.382s 13d 16' 40.66"	-75.521074	0.494 MB/s
Ka	36.25GHz	8.0MHz	0.78125 %	2	125.0kHz / 125.0kHz	36.30963GHz	-26.0km/s LSR Radio	9h 47m 57.382s 13d 16' 40.66"	-82.623801	1.777 GB/h

Baseband	ID	SB Bandwidth	Frequency Range	Fixed To Baseband	Center	Polarization	BIBPs	Recirculation	Channels	Ch. Width	Phased	Data Rate	Priority	Comments
A0/C0	0	8MHz	36.39152107GHz - 36.39952107GHz	No	36.39552107GHz	Full	1	1x	64	125.0kHz	No	0.247 MB/s	0	Generated from HC3N - 36.39232GHz
B0/D0	0	8MHz	36.30882380GHz - 36.31682380GHz	No	36.31282380GHz	Full	1	1x	64	125.0kHz	No	0.247 MB/s	0	Generated from SIS - 36.30963GHz

Step 2

Validation Tab

Correlator Resource Table

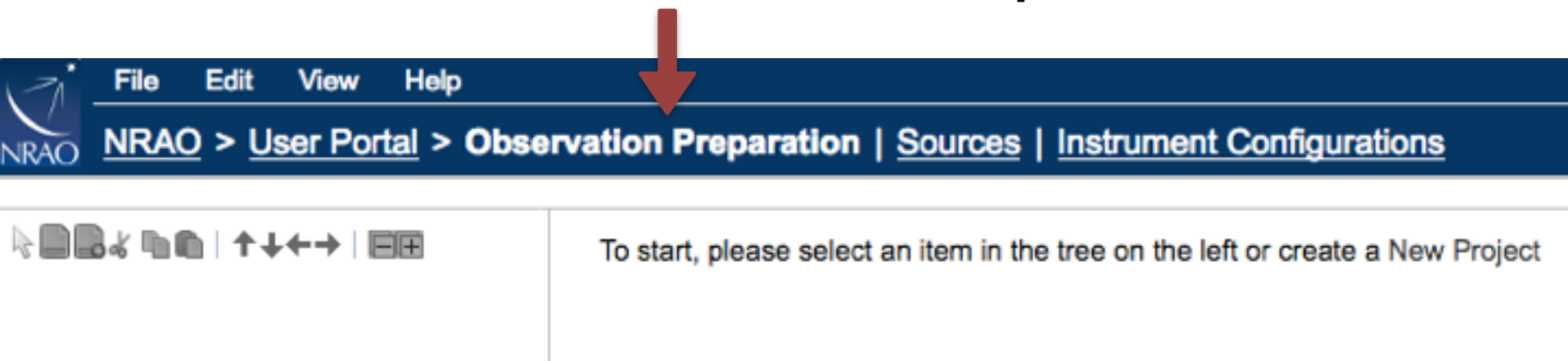
Subband Grid Boundaries

A0/C0		B0/D0	
Sky Frequency	Offset	Sky Frequency	Offset
35.808GHz	0GHz	35.738GHz	0GHz
35.936GHz	128MHz	35.866GHz	128MHz
36.064GHz	256MHz	35.994GHz	256MHz
36.192GHz	384MHz	36.122GHz	384MHz
36.32GHz	512MHz	36.25GHz	512MHz
36.448GHz	640MHz	36.378GHz	640MHz
36.576GHz	768MHz	36.506GHz	768MHz
36.704GHz	896MHz	36.634GHz	896MHz
36.832GHz	1.024GHz	36.762GHz	1.024GHz

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Q1	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q3	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Step 3 Observation Preparation Tool (OPT)

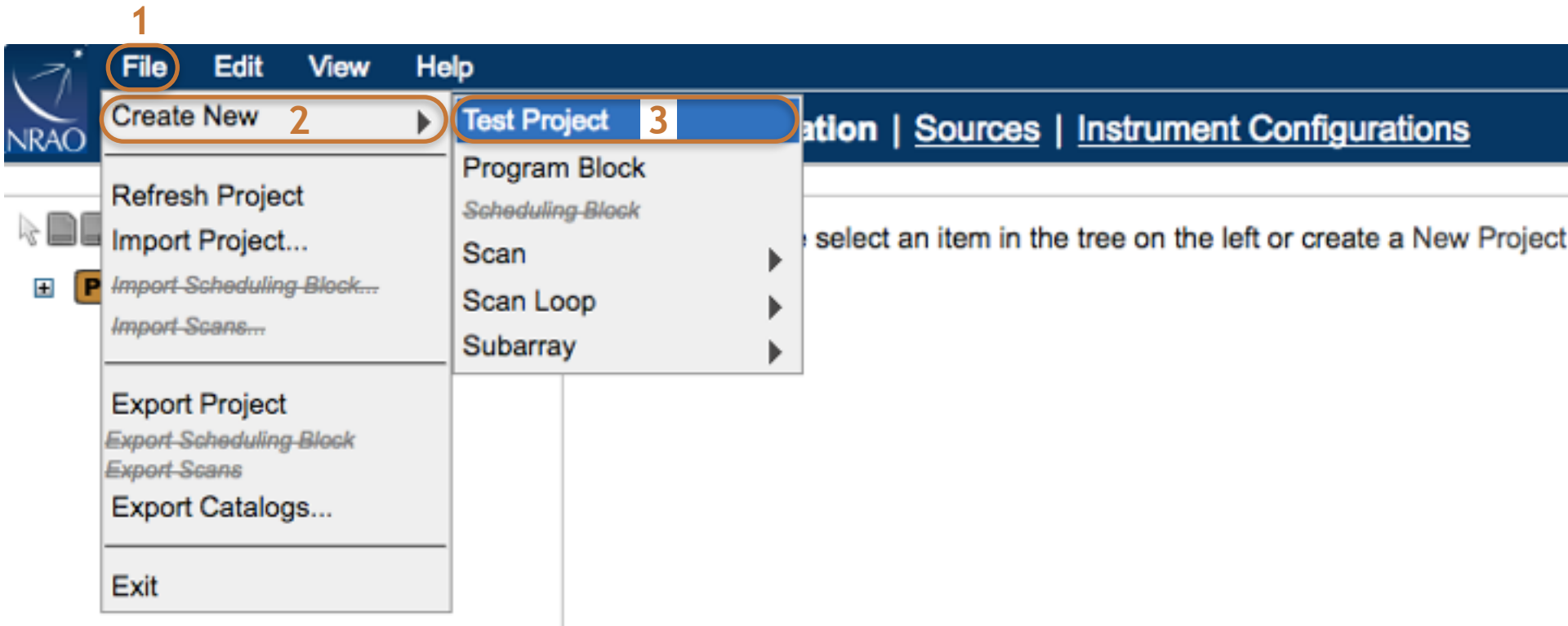
In the OPT: click on Observation Preparation



Due to shortness of time, we will skip a few steps in the OPT portion of the tutorial and provide an xml file of the completed SB.

Step 3 Observation Preparation Tool (OPT)

File → Create New → Test Project



Step 3 Project

File Edit View Help

NRAO > User Portal > Observation Preparation | Sources | Instrument Configurations

P [New Project] ←
 PB [New Program Block]
 SB [New Scheduling Block]

PROJECT DETAILS

TITLE	[New Project]	PROJECT CODE	7762_1
PROPOSAL CODE	[None]	TYPE	SIMPLE
TELESCOPE	EVLA	TEST PROJECT?	Yes
ALLOCATED TIME (HRS)	0.00	TIME USED (HRS)	0.00

PRINCIPAL INVESTIGATOR AND COAUTHORS

PRINCIPAL INVESTIGATOR

RECEIVE EMAILS? Yes No

PROPOSAL CONTACT AUTHOR
Not Specified

CURRENT COAUTHORS

Name	E-mail	Receive Emails?
Remove Coauthors		

Last Name: Search

Name	E-mail
Add Coauthors	

Step 3 Program Block

P DEMO IRC+10216

PB D config ←

SB [New Scheduling Block], 00:

PROGRAM BLOCK DETAILS

NAME **D config** SCHEDULING PRIORITY

 ALLOCATED TIME (HRS) 0.00 USED TIME (HRS) 0.00 COMPLETED?

ACCEPTABLE CONFIGURATIONS

Drag configurations from the list on the right to the left to choose that configuration.
 Drag configurations on the left up and down in order to adjust their priority.
 Drag configurations from the list on the left to the right to remove that configuration.

ACCEPTABLE CONFIGURATIONS

D



AVAILABLE CONFIGURATIONS


A	←
B	←
C	←
BNA	←
A=>D	←
B=>BNA	←
BNA=>A	←
B=>A	←
C=>B	←
D=>C	←
Any	←

Drag over
configuration

Step 3 Program Block


List of Scheduling Blocks created by the observer.

SCHEDULING BLOCKS



Name	Index	Id# ▲	Status	Executions	Total Time	Per Execution	Scheduled Start	Wind	Api
[New Scheduling Block]	0	34808183	NOT_SUBMITTED	done 0 of 1	00:00:00	00:00:00	00:00-23:45 LST	---	---

EXECUTION BLOCKS



SB ID	EB ID	Status	Duration	Started ▼	Finished	Initial API (°)	Initial Wind (m/s)	Script + VCI
-------	-------	--------	----------	-----------	----------	-----------------	--------------------	--------------

Once an SB has been observed, the Execution Block will be listed.

Step 3 Scheduling Block Information

- SB name: IRC+10216 Ka
- LST start range:
 - LST target/complex gain_cal/ref_cal: 05:40–13:50
 - LST Bandpass_cal: 08:55–16:00
 - LST Flux_cal: 08:40–18:30 (avoid 12:45–14:15, EL > 80°)

Assuming a 3 hour long SB:

**One possible LST start range is 08:30–09:45
(if the flux cal (3C286 rising) is observed at the end)**

- Wind and APL constraints: choose Ka-band

Step 3 Scheduling Block Information Tab

Information Reports Validation and Submission Bulk Scan Edit Executions

SCHEDULING BLOCK DETAILS

GENERATED ID 34808183

NAME IRC+10216 Ka

STATUS NOT_SUBMITTED

ACCEPTABLE CONFIGURATIONS D

COUNT 1

COMPLETED 0

TOTAL TIME 00:00:00

TIME PER EXECUTION 00:00:00

SCHEDULE TYPE Dynamic

Provide a name

Valid special characters are:
spaces + - _ * /

LST start range
08:30–09:45

LST START RANGE 08 : 30 - 09 : 45 Remove

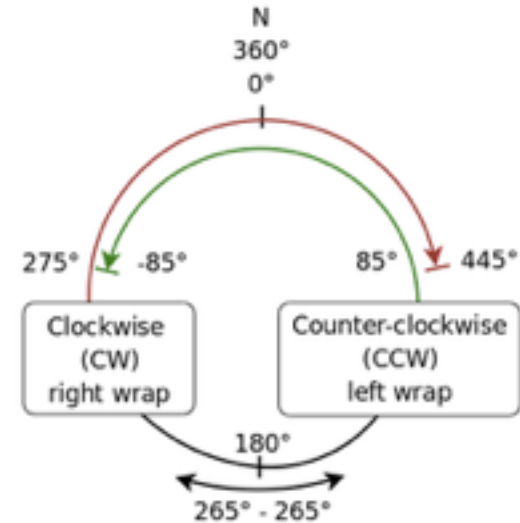
Add

EARLIEST UT START DATE/TIME: 2017/12/27 20:54:16

LATEST UT START DATE/TIME: 2099/12/31 23:59:59

AVOID SUNRISE

AVOID SUNSET



Step 3 Scheduling Block Information Tab

**Ka-band
Wind & APL
constraints**

	Description	Wind	Atmospheric Phase Limit
<input type="radio"/>	Lowest Frequencies (4, P, and L)	Any	Any
<input type="radio"/>	2.0GHz - 4.0GHz (S)	Any	60.0 degrees
<input type="radio"/>	4.0GHz - 8.0GHz (C)	Any	45.0 degrees
<input type="radio"/>	8.0GHz - 12.0GHz (X)	15.0 m/s	30.0 degrees
<input type="radio"/>	12.0GHz - 18.0GHz (Ku)	10.0 m/s	15.0 degrees
<input type="radio"/>	18.0GHz - 26.5GHz (K)	7.0 m/s	10.0 degrees
<input checked="" type="radio"/>	26.5GHz - 40.0GHz (Ka)	6.0 m/s	7.0 degrees
<input type="radio"/>	40.0GHz - 50.0GHz (Q)	5.0 m/s	5.0 degrees
<input type="radio"/>	Specified Constraints	<input type="text"/> m/s	<input type="text"/> degrees

COMMENTS TO THE OPERATOR

Step 3 Scheduling Block – Scans

- Start-up Sequence
 - Setup scan for each instrument configuration:
 - ▶ Ka-band configuration
 - ▶ X-band reference pointing configuration
 - X-band reference pointing scan on J0954+1743

(For high frequency observing, the start-up should sum up to at least 12 min.)

- Ka-band Complex Gain calibrator J0954+1743
- Ka-band Target-Complex Gain cal loop
 - Repeat the last three steps
- X-band reference pointing on J1224+0330 for Bandpass/Delay cal
- Ka-band scan on Bandpass/Delay cal J1229+0203
- X-band reference pointing on Flux cal 3C286
- Ka-band scan on Flux cal 3C286

Step 3 Scheduling Block – Scan Intents

Select the appropriate scan intent for each source.

IRC+10216 → Observe Target

J0954+1743 → Calibrate Complex Gain (A and P)

J1229+0203 → Calibrate Bandpass & Calibrate Delay

J1224+0330 → Calibrate Offset Pointing (only used for reference pointing)

3C286 → Calibrate Flux Density Scale

setup scans → Setup Intent

When using reference pointing, check the **Apply Last** box to all standard observing mode scans that follow. Otherwise, the reference pointing corrections will not be applied.

INTENTS

- OBSERVE TARGET
- CALIBRATE COMPLEX GAIN (A AND P)
- CALIBRATE FLUX DENSITY SCALE
- CALIBRATE BANDPASS
- SETUP INTENT

Less <<<

- CALIBRATE DELAY
- CALIBRATE POLARIZATION ANGLE
- CALIBRATE POLARIZATION LEAKAGE
- DETERMINE AUTOPHASE
- CALIBRATE AMPLITUDE
- CALIBRATE PHASE

Step 3 Create a New Scan

File → Create New → Scan → In

1

The screenshot shows the NRAO software interface. The 'File' menu is open, and the 'Create New' option is selected. The 'Scan' option is also selected, and the 'In' sub-option is highlighted in blue. The background shows a form for creating a new scan with the following fields:

NAME	IRC+10216 Ka
STATUS	NOT_SUBMITTED
ACCEPTABLE CONFIGURATIONS	D
COUNT	1
COMPLETED	0
TOTAL TIME	00:00:00
TIME PER EXECUTION	00:00:00
SCHEDULE TYPE	Dynamic
LST START RANGE	08 : 30 - 09 : 45

Step 3 New Scan

DEMO IRC+10216

- D config
 - IRC+10216 Ka, 00:00:00
 - STD: [New Scan]

Overview **Comments**

SCAN DETAILS

NAME	SCAN MODE	ANTENNA WRAP	REFERENCE POINTING	PHASE & DELAY CAL	RECORD ON MARK V	OVER THE TOP
[New Scan]	Standard Observing	No Preference	<input type="checkbox"/> Apply Last?	<input type="checkbox"/> Apply Last?	<input type="checkbox"/> Allow?	<input type="checkbox"/> Allow?

TARGET SOURCE	HARDWARE SETUP	SCAN TIMING	INTENTS
No Source Assigned <input type="button" value="Import"/>	No Instrument Config. Assigned <input type="checkbox"/> Keep Previous Conf. <input type="button" value="Import"/>	Duration (LST) 00:05:00	<input checked="" type="checkbox"/> OBSERVE TARGET <input type="checkbox"/> CALIBRATE COMPLEX GAIN (A AND P) <input type="checkbox"/> CALIBRATE FLUX DENSITY SCALE <input type="checkbox"/> CALIBRATE BANDPASS <input type="checkbox"/> SETUP INTENT More >>>

Step 3 Import Source

Import the complex gain calibrator, **J0954+1743**, from the VLA calibrator catalog.

The screenshot displays the software interface for configuring a scan. On the left, a tree view shows the project structure: DEMO IRC+10216, D config, IRC+10216 Ka, 00:00:00, and STD: [New Scan].

The main window is titled 'SCAN DETAILS' and has two tabs: 'Overview' and 'Comments'. The 'Overview' tab is active. It contains a table with columns 'NAME' and 'SCAN MODE'. Below the table, there are two sections: 'TARGET SOURCE' and 'HARDWARE SETUP'. The 'TARGET SOURCE' section shows 'No Source Assigned' and an 'Import' button (1). The 'HARDWARE SETUP' section shows 'No Instrument Config.' and a 'Keep Previous Conf' checkbox, with an 'Import' button.

A 'Choose Source' dialog box is open over the 'Import' button. It has a title bar 'Choose Source' and two dropdown menus: 'SOURCE CATALOG: VLA' (2) and 'SOURCE GROUP: RA 09' (3). Below these are the 'SOURCES:' list, which includes several radio buttons. The source 'J0954+1743' is selected (4). At the bottom of the dialog, there is a 'Change' button (5) and a 'Cancel' button.

Step 3 Import Ka-band Resource

Import the Ka-band instrument configuration you created from your resource catalog.

The screenshot shows the 'Overview' tab of the software interface. On the left, a tree view shows the project structure: DEMO IRC+10216, D config, IRC+10216 Ka, 00:00:00, and STD: J0954+1743. The main panel displays 'SCAN DETAILS' for J0954+1743, including scan mode (Standard Observing), antenna wrap (No Preference), and various calibration options. A table below shows the target source (J0954+1743) and hardware setup (No Instrument Config. Assigned). An 'Import' button is visible in the table. A 'Choose' dialog box is open, showing the 'RESOURCE CATALOG' set to 'Demo', 'RESOURCE GROUP' set to 'All', and 'RESOURCES' with 'Ka-band demo' selected. The 'Change' button is also visible. Numbered callouts 1 through 4 highlight the 'Import' button, the 'RESOURCE CATALOG' dropdown, the 'Ka-band demo' resource, and the 'Change' button respectively.

NAME	SCAN MODE	ANTENNA WRAP	REFERENCE POINTING	PHASE & DELAY CAL	RECORD ON MARK V	OVER THE TOP
J0954+1743	Standard Observing	No Preference	<input type="checkbox"/> Apply Last?	<input type="checkbox"/> Apply Last?	<input type="checkbox"/> Allow?	<input type="checkbox"/> Allow?

TARGET SOURCE	HARDWARE SETUP	SCAN TIMING	INTENTS
J0954+1743 RA: 9h 54m 56.823626s Dec: 17d 43' 31.22242"	No Instrument Config. Assigned <input type="checkbox"/> Keep Previous Conf.	Duration (LST)	<input checked="" type="checkbox"/> OBSERVE TARGET <input type="checkbox"/> CALIBRATE COMPLEX GAIN (A AND P) <input type="checkbox"/> CALIBRATE FLUX DENSITY SCALE <input type="checkbox"/> CALIBRATE BANDPASS

Step 3 Ka-band Setup Scan Details

Scan name can be changed (spaces + - _ / are valid special characters)

Overview **Comments**

SCAN DETAILS

Do not check Apply Last for initial setup scans or for reference pointing scans.

NAME	SCAN MODE	ANTENNA WRAP	REFERENCE POINTING	PHASE & DELAY CAL	RECORD ON MARK V	OVER THE TOP
Ka setup	Standard Observing	No Preference	<input type="checkbox"/> Apply Last?	<input type="checkbox"/> Apply Last?	<input type="checkbox"/> Allow?	<input type="checkbox"/> Allow?

TARGET SOURCE	HARDWARE SETUP	SCAN TIMING	INTENTS
J0954+1743 RA: 9h 54m 56.823626s DEC: 17d 43' 31.22242" <input type="button" value="Import"/>	Ka-band demo Receiver: Ka-band A0/C0: 36.39232GHz B0/D0: 36.30963GHz <input type="checkbox"/> Keep Previous Conf. <input type="button" value="Import"/>	Duration (LST) <input type="text" value="00:01:00"/>	<input type="checkbox"/> OBSERVE TARGET <input type="checkbox"/> CALIBRATE COMPLEX GAIN (A AND P) <input type="checkbox"/> CALIBRATE FLUX DENSITY SCALE <input type="checkbox"/> CALIBRATE BANDPASS <input checked="" type="checkbox"/> SETUP INTENT <input type="button" value="More >>>"/>

Setup scan must be at least **1 minute in Duration (LST)** and select the **Setup Intent** (unselect Observe Target intent).

Step 3 Copy Scan

Edit → Copy STD: <scan name>

1

2

The screenshot shows the NRAO observation preparation software interface. The 'Edit' menu is open, and 'Copy STD: K setup' is selected. The main window displays the 'SCAN DETAILS' for the 'K setup' scan. The interface includes a table with columns for NAME, SCAN MODE, ANTENNA WRAP, REFERENCE POINTING, PHASE & DELAY CAL, RECORD ON MARK V, and OVER THE TOP. Below this is a table with columns for TARGET SOURCE, HARDWARE SETUP, SCAN TIMING, and INTENTS.

NAME	SCAN MODE	ANTENNA WRAP	REFERENCE POINTING	PHASE & DELAY CAL	RECORD ON MARK V	OVER THE TOP
K setup	Standard Observing	No Preference	<input type="checkbox"/> Apply Last?	<input type="checkbox"/> Apply Last?	<input type="checkbox"/> Allow?	<input type="checkbox"/> Allow?

TARGET SOURCE	HARDWARE SETUP	SCAN TIMING	INTENTS
J0954+1743 RA: 9h 54m 56.823626s Dec: 17d 43' 31.22242"	Ka-band demo Receiver: Ka-band A0/C0: 36.39232GHz B0/D0: 36.30963GHz <input type="checkbox"/> Keep Previous Conf.	Duration (LST) 00:01:00	<input type="checkbox"/> OBSERVE TARGET <input type="checkbox"/> CALIBRATE COMPLEX GAIN (A AND P) <input type="checkbox"/> CALIBRATE FLUX DENSITY SCALE <input type="checkbox"/> CALIBRATE BANDPASS <input checked="" type="checkbox"/> SETUP INTENT More >>>

Step 3 Paste Scan

Edit → Paste → Paste After STD: <scan name>

The screenshot shows the NRAO observation preparation software interface. The 'Edit' menu is open, and the 'Paste' option is selected. The 'Paste After STD: K setup' option is highlighted. The interface includes a menu bar, a tree view on the left, and a main configuration table.

NAME	SCAN MODE	ANTENNA WRAP	REFERENCE POINTING	PHASE & DELAY CAL	RECORD ON MARK V	OVER THE TOP
K setup	Standard Observing	No Preference	<input type="checkbox"/> Apply Last?	<input type="checkbox"/> Apply Last?	<input type="checkbox"/> Allow?	<input type="checkbox"/> Allow?

TARGET SOURCE	HARDWARE SETUP	SCAN TIMING	INTENTS
J0954+1743 RA: 9h 54m 56.823626s Dec: 17d 43' 31.22242"	Ka-band demo Receiver: Ka-band A0/C0: 36.39232GHz B0/D0: 36.30963GHz <input type="checkbox"/> Keep Previous Conf.	Duration (LST) 00:01:00	<input type="checkbox"/> OBSERVE TARGET <input type="checkbox"/> CALIBRATE COMPLEX GAIN (A AND P) <input type="checkbox"/> CALIBRATE FLUX DENSITY SCALE <input type="checkbox"/> CALIBRATE BANDPASS <input checked="" type="checkbox"/> SETUP INTENT More >>>

Step 3 Import X-band Pointing Resource

Import the X-band pointing resource from the NRAO Defaults resource catalog.

Change the scan name.

Copy/paste this scan to create the reference pointing scan.

1 Import

2 RESOURCE CATALOG: NRAO Defaults

3 X band pointing

4 Change

NAME	SCAN MODE
X setup	Standard Observing

TARGET SOURCE	HARDWARE SETUP
J0954+1743 RA: 9h 54m 56.823626s Dec: 17d 43' 31.22242"	Ka-band demo Receiver: Ka-band A0/C0: 36.39232GHz B0/D0: 36.30963GHz <input type="checkbox"/> Keep Previous Config

RESOURCES:

- X band pointing
- C band pointing
- K64f3 wide 3s
- K64d3 wide 3s
- K64s3 wide 3s
- Ka64f3 wide 3s
- Ka64d3 wide 3s
- Ka64s3 wide 3s
- Q64f3 wide 3s
- Q64d3 wide 3s
- Q64s3 wide 3s
- L16f5DC
- S16f5DC
- C16f5DC
- X16f5DCB
- Ku16f3DCB
- K16f3DCB
- Ka16f3DCB
- Q16f3DCB
- K64f2
- K64d2

Step 3 X-band Reference Pointing Scan

Change scan name

Change scan mode to **Interferometric Pointing**

NAME	SCAN MODE	ANTENNA WRAP	REFERENCE POINTING	PHASE & DELAY CAL	RECORD ON MARK V	OVER THE TOP
X ref ptg	Interferometric Pointing	No Preference	<input type="checkbox"/> Apply Last?	<input type="checkbox"/> Apply Last?	<input type="checkbox"/> Allow?	<input type="checkbox"/> Allow?

TARGET SOURCE	HARDWARE SETUP	SCAN TIMING	INTENTS
J0954+1743 RA: 9h 54m 56.823626s DEC: 17d 43' 31.22242" <input type="button" value="Import"/>	X band pointing Receiver: X-band A0/C0: 8396.0MHz B0/D0: 8524.0MHz <input type="button" value="Import"/>	Duration (LST) 00:10:00	<input checked="" type="checkbox"/> CALIBRATE OFFSET POINTING

Calibrate Offset Pointing intent will automatically be selected.

Increase scan duration to at least **10 minutes** to allow for a 12 minute start-up.

Step 3 Ka-band Complex Gain Cal Scan

(Copy/paste Ka-band setup scan to create this scan.)

Change name of scan.

(We used phase simply to shorten the name of the scan.)

Overview

Comments

SCAN DETAILS

Select **Apply Last** to apply reference pointing corrections.

NAME	SCAN MODE	ANTENNA WRAP	REFERENCE POINTING	PHASE & DELAY CAL	RECORD ON MARK V	OVER THE TOP
phase	Standard Observing	No Preference	<input checked="" type="checkbox"/> Apply Last?	<input type="checkbox"/> Apply Last?	<input type="checkbox"/> Allow?	<input type="checkbox"/> Allow?

TARGET SOURCE	HARDWARE SETUP	SCAN TIMING	INTENTS
J0954+1743 RA: 9h 54m 56.823626s Dec: 17d 43' 31.22242"	Ka-band demo Receiver: Ka-band A0/C0: 36.39232GHz B0/D0: 36.30963GHz <input type="checkbox"/> Keep Previous Conf.	Duration (LST) 00:02:00	<input type="checkbox"/> OBSERVE TARGET <input checked="" type="checkbox"/> CALIBRATE COMPLEX GAIN (A AND P) <input type="checkbox"/> CALIBRATE FLUX DENSITY SCALE <input type="checkbox"/> CALIBRATE BANDPASS <input type="checkbox"/> SETUP INTENT More >>>

2 minute scan duration is dependent on various factors (i.e., slew time, required on source time, etc.)

Select appropriate scan intent for the complex gain calibrator.

Step 3 Create a Loop

Create a loop for the science target and complex gain cal scans.

File → Create New → Scan Loop → After

1

The screenshot shows the NRAO software interface. The 'File' menu is open, and the path 'File → Create New → Scan Loop → After' is highlighted with orange boxes and numbered 1 through 4. The main window displays a table with the following data:

TARGET SOURCE	HARDWARE SETUP	SCAN TIMING	INTENTS
J0954+1743 RA: 9h 54m 56.823626s Dec: 17d 43' 31.22242"	Ka-band demo Receiver: Ka-band A0/C0: 36.39232GHz B0/D0: 36.30963GHz <input type="checkbox"/> Keep Previous Conf.	Duration (LST) 00:02:00	<input type="checkbox"/> OBSERVE TARGET <input checked="" type="checkbox"/> CALIBRATE COMPLEX GAIN (A AND P) <input type="checkbox"/> CALIBRATE FLUX DENSITY SCALE <input type="checkbox"/> CALIBRATE BANDPASS <input type="checkbox"/> SETUP INTENT More >>>

Step 3 Edit Loop

DEMO IRC+10216

- D config
 - IRC+10216 Ka, 00:01:00
 - STD: Ka setup
 - STD: X setup
 - IP: X ref ptg
 - STD: phase
 - (1X) [New Loop]

Details Bulk Scan Edit

SCAN LOOP DETAILS

SCAN LOOP NAME [New Loop] Provide a name

LOOP ITERATIONS 1 Adjust the loop iterations to 7

BRACKETED? (Performs your first scan one extra time at the end of the loop.)

Since we start with a complex gain calibrator before the loop, we will not use the bracket feature within the loop.

Step 3 Options for Adding Scans to a Loop

- Select the loop:
 - ▶ File → Create New → Scan → In
- Select the scan you want to copy:
 - ▶ Edit → Copy STD: <scan name>
 - ▶ Select the loop you want to paste the scan into:
 - ▶ Edit → Paste Into (nX) <loop name>
(where n is the loop iterations)

The icons shown below can also be used to add a new scan, cut/copy/paste a scan, or move a scan up or down within the SB. (In the OPT, hover over each icon for a short description.)



Step 3 Import xml File

So you may jump ahead to see the completed SB described in this tutorial, we have provided a file called:

OPT_demo.xml

To download the file:

- ▶ Go to <ftp://ftp.aoc.nrao.edu/pub/NRAO-CDE/INAOE2018>
- ▶ Right-click on OPT_demo.xml
- ▶ Save Link As
- ▶ Save to Desktop or Downloads folder

To import the file into the OPT:

- ▶ Go to File → Import Project
- ▶ Browse to locate the file and then import. (Click once and wait a few seconds for the import process to complete.)
- ▶ Then expand the contents to see the Project, Program Block, and Scheduling Block.

Step 3

Finished Scheduling Block

Select '+' to open all loops in SB.

- DEMO IRC+10216
 - D config
 - SB IRC+10216 Ka, 03:00:00
 - STD: Ka setup
 - STD: X setup
 - IP: X ref ptg
 - STD: phase
 - (7X) Target-Phase Loop
 - STD: target
 - STD: phase
 - IP: X ref ptg
 - STD: phase
 - (7X) Target-Phase Loop
 - STD: target
 - STD: phase
 - IP: X ref ptg
 - STD: phase
 - (7X) Target-Phase Loop
 - STD: target
 - STD: phase
 - IP: X ref ptg bp
 - STD: bandpass
 - IP: X ref ptg flux
 - STD: flux

High Freq Start-up Sequence: setup scans + reference pointing

ComplexGain - Target - ComplexGain + reference pointing
(bracketing is important for best phase calibration)

Bandpass/Delay & Flux Density + reference pointing

Step 3 Reports Tab

Check LST start range (08:30–09:45) for appropriate on source time and EL for all scans:

- Required minimum on source time, after slewing:
 - Reference pointing scans:
 - ▶ 2.5 min on source
 - Standard observing scans:
 - ▶ 40 sec on source for flux density calibration
 - ▶ 20 sec on source for all other calibration and science target scans
 - More time may be required depending on the required signal to noise.
- High frequency elevation limits: $30^\circ < \text{EL} < 80^\circ$

Step 3 Reports Tab

Information

Reports

Validation and Submission

Bulk Scan Edit

Executions

OBSERVING PROGRAM

PROJECT CODE: _____ GENERATED ID: 34808183
 PRINCIPAL INVESTIGATOR: _____

[Use your browser's Print feature to print this report.](#)

ASSUMED STARTING CONDITIONS

WIND CONSTRAINTS: 6.0 m/s API CONSTRAINTS: 7.0 degrees
 LST START RANGE: 08:30-09:45

ASSUMED LST START: LST

COMPUTED LST STOP: 64846 11:29:59.997677418862918770999181317176895258426871802 LST

ASSUMED ANTENNA STARTING DIRECTION

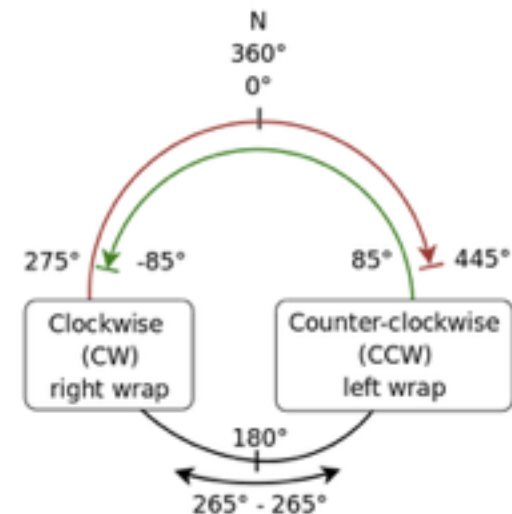
AZIMUTH: ELEVATION: COORDINATE SYSTEM: HORIZONTAL

MINIMUM ELEVATION WARNING

MINIMUM ELEVATION: degrees (VLA antennas cannot observe below 8 degrees)

SHADOW WARNING CALCULATIONS

SHADOWING LIMIT (MAX): IN CONFIGURATION:



COMPUTED SUMMARIES

- [Instrument Configuration Summary Test](#)
- [Time On Source Summary](#)
- [Schedule Summary](#)

[Export Tables as CSV \(opens in new window\)](#)

Step 3 Reports Tab: Schedule Summary/Report

When stepping through the LST start range, check the schedule **Summary Report** for on source time, elevation limits, warnings or errors if there are any (i.e., antenna shadowing), etc.. Note, no time on source for the setup scans is ok.

Open all loops

NATIONAL RADIO ASTRONOMY OBSERVATORY VLA OBSERVING PROGRAM 7762_1 FOR DAY 64846 LST 08:30:00 (THU DEC 28 09:12:19 UTC 2017) SUMMARY REPORT.											
Scan	Source	Scan	AC Freq.	Start LST	Slew	Modifiers	Start HA	Start Az	Start El	Start PA	
			BD Freq.	Stop LST	On Source		End HA	End Az	End El	End PA	
1	J0954+1743	Ka setup	36.32183714GHz	08:30:00	00:01:00.0	SetAtnGain	-1.42	125.4d	65.0d	-45.1d	
		(1) Ka-band demo	36.25183297GHz	08:31:00	00:00:00.0		-1.40	125.8d	65.1d	-44.8d	
2	J0954+1743	X setup	8.46GHz	08:31:00	00:01:00.0	SetAtnGain	-1.40	125.8d	65.1d	-44.8d	
		(2) X band pointing	8.588GHz	08:32:00	00:00:00.0		-1.38	126.2d	65.3d	-44.6d	
3	J0954+1743	X ref ptg	8.46GHz	08:32:00	00:00:38.944	CalOffPtg	-1.38	126.2d	65.3d	-44.6d	
		(2) X band pointing	8.588GHz	08:42:00	00:09:21.057		-1.22	130.5d	66.9d	-41.4d	
4	J0954+1743	phase	36.32183714GHz	08:42:00	00:00:20.055	CalGain, Apply Ref. Ptg.	-1.22	130.5d	66.9d	-41.4d	
		(1) Ka-band demo	36.25183297GHz	08:44:00	00:01:39.945		-1.18	131.4d	67.2d	-40.7d	
LOOP		Target-Phase Loop									
5	IRC+10216	target	36.32183714GHz	08:44:00	00:00:22.887	ObsTgt, Apply Ref. Ptg.	-1.07	141.2d	64.6d	-32.2d	
		(1) Ka-band demo	36.25183297GHz	08:49:00	00:04:37.113		-0.98	143.7d	65.3d	-30.2d	
6	J0954+1743	phase	36.32183714GHz	08:49:00	00:00:22.970	CalGain, Apply Ref. Ptg.	-1.10	133.8d	68.0d	-38.8d	
		(1) Ka-band demo	36.25183297GHz	08:50:30	00:01:07.030		-1.07	134.6d	68.2d	-38.3d	
7	IRC+10216	target	36.32183714GHz	08:50:30	00:00:22.985	ObsTgt, Apply Ref. Ptg.	-0.96	144.5d	65.5d	-29.6d	
		(1) Ka-band demo	36.25183297GHz	08:55:30	00:04:37.016		-0.87	147.1d	66.0d	-27.6d	
8	J0954+1743	phase	36.32183714GHz	08:55:30	00:00:22.993	CalGain, Apply Ref. Ptg.	-0.99	137.2d	68.9d	-36.2d	
		(1) Ka-band demo	36.25183297GHz	08:57:00	00:01:07.007		-0.97	138.0d	69.1d	-35.6d	

Step 3 Reports Tab: Time On Source Summary

The **Time On Source Summary** provides a sum of the total time spent on source for each source by scan intent and resource. This number will change for all LST start times due to changes in slewing.

TIME ON SOURCE SUMMARY (TIME IN: LST)								
Source	Scan	Modifiers	RA	AC Vel.	AC Freq.	Min HA	Min PA	#
Epoch	Instrument Cfg.		Dec	BD Vel.	BD Freq.	Max HA	Max PA	
J0954+1743	Ka setup	SetAtnGain	9h 54m 56.82363s	-26.0km/s LSR Radio	36.32183714GHz	-1.42	-45.1d	1
J2000	(1) Ka-band demo		17d 43' 31.2224"	-26.0km/s LSR Radio	36.25183297GHz	-1.40	-44.8d	00:00:00.0
J0954+1743	X setup	SetAtnGain	9h 54m 56.82363s	---	8.46GHz	-1.40	-44.8d	1
J2000	(2) X band pointing		17d 43' 31.2224"	---	8.588GHz	-1.38	-44.8d	00:00:00.0
J0954+1743	X ref ptg	CalOffPtg	9h 54m 56.82363s	---	8.46GHz	-1.38	-44.6d	3
J2000	(2) X band pointing		17d 43' 31.2224"	---	8.588GHz	0.48	20.3d	00:15:40.948
J0954+1743	phase	CalGain	9h 54m 56.82363s	-26.0km/s LSR Radio	36.32183714GHz	-1.22	-41.4d	24
J2000	(1) Ka-band demo		17d 43' 31.2224"	-26.0km/s LSR Radio	36.25183297GHz	1.26	42.3d	00:28:03.957
IRC+10216	target	ObsTgt	9h 47m 57.382s	-26.0km/s LSR Radio	36.32183714GHz	-1.07	-32.2d	21
J2000	(1) Ka-band demo		13d 16' 40.86"	-26.0km/s LSR Radio	36.25183297GHz	1.35	38.1d	01:37:18.483
J1224+0330	X ref ptg bp	CalOffPtg	12h 24m 52.42194s	---	8.46GHz	-1.24	-27.2d	1
J2000	(2) X band pointing		3d 30' 50.2929"	---	8.588GHz	-1.15	-25.7d	00:02:45.148
J1229+0203	bandpass	CalBP, CalDelay	12h 29m 6.69973s	-26.0km/s LSR Radio	36.32183714GHz	-1.22	-26.1d	1
J2000	(1) Ka-band demo		2d 3' 8.5982"	-26.0km/s LSR Radio	36.25183297GHz	-1.13	-24.4d	00:05:09.945
1331+305=3C286	X ref ptg flux	CalOffPtg	13h 31m 8.28798s	---	8.46GHz	-2.16	-73.9d	1
J2000	(2) X band pointing		30d 30' 32.9589"	---	8.588GHz	-2.08	-74.0d	00:03:19.095
1331+305=3C286	flux	CalFlux	13h 31m 8.28798s	-26.0km/s LSR Radio	36.32183714GHz	-2.08	-74.0d	1
J2000	(1) Ka-band demo		30d 30' 32.9589"	-26.0km/s LSR Radio	36.25183297GHz	-2.02	-74.0d	00:03:24.946

Step 3 Reports Tab: Instrument Configuration Summary

Double check the resources used are correct and each have a corresponding setup scan. If an unintended resource is selected in a scan, it will appear in the **Instrument Configuration Summary**.

INSTRUMENT CONFIGURATION SUMMARY											
Name	T _{int}	AC BB _{center} Freq	AC Summed BW	AC Coverage	Req. BIBPs	# Channels	AC Doppler Line	AC Doppler Vel.	AC Doppler Pos.	AC Doppler Off.	Data Rate
	Band	BD BB _{center} Freq	BD Summed BW	BD Coverage	Act. BIBPs	Min/Max Width	BD Doppler Line	BD Doppler Vel.	BD Doppler Pos.	BD Doppler Off.	
1 Ka-band demo	3s	36.32183714GHz	8.0MHz	0.78125 %	2	128	36.39232GHz	-26.0km/s LSR Radio	9h 47m 57.382s 13d 16' 40.66"	-75.521074	0.494 MB/s
	Ka	36.25183297GHz	8.0MHz	0.78125 %	2	125.0kHz / 125.0kHz	36.30963GHz	-26.0km/s LSR Radio	9h 47m 57.382s 13d 16' 40.66"	-62.823801	1.777 GB/h
Show All Subbands											
2 X band pointing	1s	8.46GHz	128.0MHz	12.5 %	2	128	---	---	---	---	1.481 MB/s
	X	8.588GHz	128.0MHz	12.5 %	2	2.0MHz / 2.0MHz	---	---	---	---	5.331 GB/h
Show All Subbands											



For more details, click on **Show All Subbands**.

Step 3 Double Check Lines Using Dopset

OPT Input Parameters

64846 LST day, 08:30 LST, IRC+10216 position,
and respective line rest frequencies

INSTRUMENT CONFIGURATION SUMMARY														
Name	T _{int}	AC BB _{center} Freq	AC Summed BW	AC Coverage	Req. BIBPs	# Channels	AC Doppler Line	AC Doppler Vel.	AC Doppler Pos.	AC Doppler Off.	Data Rate			
	Band	BD BB _{center} Freq	BD Summed BW	BD Coverage	Act. BIBPs	Min/Max Width	BD Doppler Line	BD Doppler Vel.	BD Doppler Pos.	BD Doppler Off.				
1 Ka-band demo	3s	36.32183714GHz	8.0MHz	0.78125 %	2	128	36.39232GHz	-26.0km/s LSR Radio	9h 47m 57.382s 13d 16' 40.66"	-75.521074	0.494 MB/s			
	Ka	36.25183297GHz	8.0MHz	0.78125 %	2	125.0kHz / 125.0kHz	36.30963GHz	-26.0km/s LSR Radio	9h 47m 57.382s 13d 16' 40.66"	-62.823801	1.777 GB/h			
Hide All Subbands Hide A0/C0 Hide B0/D0														
Baseband	ID	Bandwidth	Frequency Range	Fixed	Center	Polarization	BIBPs	Recirculation	Channels	Ch. Width	Phased	Data Rate	Priority	Comments
A0/C0	0	8MHz	36.39335821GHz - 36.40135821GHz	No	36.39735821GHz	Full	1	1*	64	125.0kHz	No	0.247 MB/s	0	Generated from HC3N - 36.39232GHz
B0/D0	0	8MHz	36.31065677GHz - 36.31865677GHz	No	36.31465677GHz	Full	1	1*	64	125.0kHz	No	0.247 MB/s	0	Generated from SiS - 36.30963GHz

OPT Center Frequency Calculations

HC3N = 36.39735821 GHz

SiS = 36.31465677 GHz

Step 3 Compare Dopset & OPT Calculations

Online Dopset Tool

<http://www.vla.nrao.edu/astro/guides/dopset/>

The Dopset Tool can be used to calculate absolute (sky) frequencies given a position, an epoch, a rest frequency, and velocity information.

The LST day is a term dating back to the VLA days. It can be calculated from the Modified Julian Date (MJD) as follows:

$$\text{LST Day} = 6572.1572917 + 1.002737909350759 * \text{MJD}$$

Right Ascension (J2000): Hours Minutes Seconds

Declination (J2000): Degrees Minutes Seconds

line rest frequency (MHz):

velocity (km/s): Frame: LSR Heliocentric Type:
radio optical

LST day: Hours Minutes Seconds

Calculate Frequency

Dopset Input Parameters
64846 LST day, 08:30 LST,
IRC+10216 position, and
respective line rest frequencies

HC3N Center Frequency Calculations

OPT = 36.39735821 GHz
Dopset = 36.397358744 GHz

SiS Center Frequency Calculations

OPT = 36.31465677 GHz
Dopset = 36.314657295 GHz

Step 3 Validation and Submission Tab

Information Reports **Validation and Submission** Bulk Scan Edit Executions

VALIDATE SCHEDULING BLOCK

To submit your project, click Validate below. If there are no errors, you may then submit the project for scheduling.

Success! Your project has no errors.

REQUEST HELP

To request help, you must file a ticket with the help desk. Clicking the button below will send you to the help desk.
Be sure to include the following text:
OPT Help for Project Code: 7762_1
SB ID: 34808183
[Request Help](#)

SUBMIT SCHEDULING BLOCK

Online Documentation

OPT Manual

go.nrao.edu/opt-doc

Guide to Observing with the VLA

go.nrao.edu/vla-obs

NRAO HelpDesk

- All submitted SBs are checked/validated by the VLA DAs.
- Unless asked:
 - We do not check the validity of the calibrators.
 - We do not check the scientific accuracy of the correlator resource(s).
- Observers will be contacted if there are any problems with an SB.

Please submit questions to the
NRAO HelpDesk
help.nrao.edu