APT – Special Requirements

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Special Requirements – Overview

• General Special Requirements (e.g. Guiding, Target Position) are generally used to restrict the scheduling of JWST observations by various constraints. The Astronomer’s Proposal Tool (APT) is used to enter the requirements into the proposal.

• Most general special requirements directly or indirectly restrict the times when observations (and/or their component visits) can be scheduled. These should be used to provide the schedulers at STScI with enough constraints to ensure that the observations are properly scheduled. Special requirements should not be used unless necessary to accomplish the scientific objectives of the proposal.

• For further information on the special requirements for JWST see our J-Dox page entitled: APT Special Requirements

https://jwst-docs.stsci.edu/jwst-astronomers-proposal-tool-overview/apt-workflow-articles/apt-special-requirements#APTSpecialRequirements-TimingSRs
Special Requirements – General Information

- There are two types of special requirements: Implicit and Explicit
  - Implicit requirements are automatically generated for observations with multiple visits (like mosaics)
    - 53 day requirement is the longest the target stays in a field of regard for the worst case Dec.
    - Visits Same PA.
    - Cannot be deleted but they can be edited.
  - Explicit Requirements are user specified (This is the majority of what will be discussed in this section of the workshop)
  - Special requirements apply to all visits within the observation they are placed on.
  - APT will automatically look for illegal or inconsistent requirements.
The special requirements tab is located under the OBSERVATION level.
Special Requirements Location in APT

There are two different sections for each of our types of special requirements; the explicit requirements are simply called Special Requirements here. We are looking at an observation with one visit, so there are no Implicit Special Requirements.
Implicit Requirements

We are now looking at a mosaic observation containing 4 visits so we have our two implicit requirements: Group-Within and Visits Same PA.
How to add Explicit Special Requirements

Under the Special Requirements tab there is a raised “Add…” button beneath the first large textbox labelled “Special Requirements” and this drop down menu will appear.
Types of Explicit Special Requirements

1. Timing
2. Position Angle
3. Solar System
4. Offset
5. Time Series Observation
6. No Parallel
7. On Hold
8. ToO and Response Time
9. Maximum Visit Duration
10. Background Limited
Types of Explicit Special Requirements

1. Timing
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Solar System Objects have their own default requirements that can be edited or deleted.

This option will only appear if you are working with a solar system object as your defined target for that observation.

J-dox: https://jwst-docs.stsci.edu/jppom/special-requirements/solar-system-special-requirements
Types of Explicit Special Requirements

1. Timing
2. Position Angle
3. Solar System
4. Offset
5. Time Series Observation
6. No Parallel
7. On Hold
8. ToO and Response Time
9. Maximum Visit Duration
10. Background Limited

Offset requirement is the same as POS TARG for HST. This allows for the placement of a target at a position away from the fiducial point of aperture (arcsec units).

Offset Special Requirement in APT

APT Special Requirements drop down menu view

Offset units are in arcsec. Proposer must indicate an offset in the X and Y directions.
Types of Explicit Special Requirements

1. Timing
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Time Series Observation requirement time-variable observations (like brown dwarfs and transiting exoplanets) and the NO PARALLEL requirement must be used in conjunction.

J-Dox: https://jwst-docs.stsci.edu/methods-and-roadmaps/jwst-time-series-observations

This requirement has no additional input by the proposer.
Types of Explicit Special Requirements

1. Timing
2. Position Angle
3. Solar System
4. Offset
5. Time Series Observation
6. No Parallel
7. On Hold
8. ToO and Response Time
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No Parallel requirement specifies that the current observation should not be allowed to have any parallel observations attached to it.

J-Dox: https://jwst-docs.stsci.edu/jppom/special-requirements/general-special-requirements#GeneralSpecialRequirements-NoPar

This requirement has no additional input by the proposer.
Types of Explicit Special Requirements

1. Timing
2. Position Angle
3. Solar System
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On Hold requirement is used to indicate that the observation can’t be made until some other activity happens first (pre-images like for NIRSpec multi object spectroscopy)

J-Dox: https://jwst-docs.stsci.edu/jwst-astronomers-proposal-tool-overview/apt-workflow-articles/apt-special-requirements#APTSpecialRequirements-GeneralormiscellaneousSRs
On Hold Special Requirement in APT

APT Special Requirements drop down menu view

An explanation as to why you are placing a visit on hold is required.
Types of Explicit Special Requirements

1. Timing
2. Position Angle
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4. Offset
5. Time Series Observation
6. No Parallel
7. On Hold
8. ToO and Response Time
9. Maximum Visit Duration
10. Background Limited

ToO and response time requirement dictates the turn around time for the observation. As a note: the absolute minimum response time is 24 hours and ANYTHING less than 14 days is considered disruptive.

Target of Opportunity and Response Time Special Requirement in APT

APT Special Requirements drop down menu view

Proposer must note the response time. An Implicit “On Hold” Special Requirement is also created with ToO.
Types of Explicit Special Requirements

1. Timing
2. Position Angle
3. Solar System
4. Offset
5. Time Series Observation
6. No Parallel
7. On Hold
8. ToO and Response Time
9. Maximum Visit Duration
10. Background Limited

The Maximum Visit Duration requirement default is 24 hours but can be reduced to increase schedule-ability.

J-Dox: https://jwst-docs.stsci.edu/ippom/special-requirements/general-special-requirements
Maximum Visit Duration Special Requirement in APT

APT Special Requirements drop down menu view

Proposer must indicate the duration in sec, min, hours or days
Types of Explicit Special Requirements

1. Timing
2. Position Angle
3. Solar System
4. Offset
5. Time Series Observation
6. No Parallel
7. On Hold
8. ToO and Response Time
9. Maximum Visit Duration
10. Background Limited

Background limited requirement is the percentage of background noise that will be tolerated.

J-Dox: https://jwst-docs.stsci.edu/jwst-observatory-functionality/jwst-background-model/background-limited-observations
APT Special
Requirements drop down menu view

Proposer must indicate the percentage of background that will be tolerated: 10%, 20%, 40%, or 80%
Explicit Special Requirement – Timing

• Timing requirements include dates & phase:
  • After Date
  • Before Date
  • Between Dates
  • Phase range
    • Period
    • Zero-Phase

J-Dox: https://jwst-docs.stsci.edu/jppom/special-requirements/timing-special-requirements

APT Special Requirements drop down menu view; links will be explained later.
Explicit Special Requirement – Timing

• Timing requirements include dates & phase:
  • After Date
  • Before Date
  • Between Dates
  • Phase Range
    • Period
    • Zero-Phase
  These are the same requirements that exist for HST. Observation to occur after a certain date, before a certain date and between two specific dates
Date Special Requirements in APT

Proposer is required to input dates either by typing in dates in the listed formats or by using the calendar built in interface. Seen here:
Explicit Special Requirement – Timing

• Timing requirements include dates & phase:
  • After Date
  • Before Date
  • Between Date
  • Phase Range
    • Period
    • Zero-Phase

The phase range is the range in which the first science activity begins and must be between 0 and 1.
Explicit Special Requirement – Timing

• Timing requirements include dates & phase:

  • After Date
  • Before Date
  • Between Date
  • Phase Range
    • Period
    • Zero-Phase

Period is the duration of the PHASE and the minimum is 5 mins.

J-Dox: https://jwst-docs.stsci.edu/jppom/special-requirements/timing-special-requirements#TimingSpecialRequirements-Phase
Phase Range Example

We want to observe an exoplanet transiting V-AU-MIC-1.

We know the PERIOD to be ~8.5 days

We want the ZERO-PHASE to ensure that the START is at the end of the transit: 2458330.3915026

We want the observation to begin at the END of the PERIOD to capture the entire transit so the PHASE RANGE is 0.98695 to 0.991875

<table>
<thead>
<tr>
<th>Phase range</th>
<th>0.98695 to 0.991875</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period</td>
<td>8.5 Days</td>
</tr>
<tr>
<td>Zero phase (HJD)</td>
<td>2458330.3815026</td>
</tr>
</tbody>
</table>

Phase 0.98695 to 0.991875 with period 8.5 Days and zero–phase 2458330.3815026 HJD
Explicit Special Requirement – Timing

• Timing requirements include dates & phase:
  • After Date
  • Before Date
  • Between Date
  • Phase Range
    • Period
    • Zero-Phase

Zero phase is the date of the zero-phase with respect to the sun.
Phase Range, Period and Zero-Phase requirements are all entered into the same window under “Phase” option in APT Special Requirements drop down menu.
Explicit Special Requirement – Position Angle

• The Position Angle Special Requirements are as follows:
  
  • Position Angle ranges
  • The angle is between 0 - 360

APT Special Requirements drop down menu view; links will be mentioned later

J-Dox: [https://jwst-docs.stsci.edu/jppom/special-requirements/aperture-position-angle-special-requirements](https://jwst-docs.stsci.edu/jppom/special-requirements/aperture-position-angle-special-requirements)
Explicit Special Requirement – Position Angle

• The Position Angle Special Requirements are as follows:

  • Position Angle ranges
    • The angle is between 0 - 360

Position Angle can be a range, or multiple ranges but they cannot overlap.

If you need to cross through zero, you need to list the angles accordingly (e.g. 90-180 $\neq$ 180-90)
Explicit Special Requirement – Position Angle

- The Position Angle Special Requirements are as follows:
  - Position Angle ranges
    - The angle is between 0 - 360
  
Position Angle is measured NORTH through EAST.
Proposer is required to enter an exact PA or PA range in either V3 or Aperture PA.
Differences between V3 and Aperture Position Angle

- V3 Position Angle is the overall angle of the whole of JWST
- Aperture Position Angle is dependent upon the instrument you are using:
  
  - NIRCam, NIRISS: V3 PA ≈ Aperture PA
  - NIRSpec ~138° difference between V3 PA and Aperture PA
  - MIRI ~5° difference between V3 PA and Aperture PA

Explicit Special Requirement – Links

• There are two ways to add links to your program: in the observations link item in the tree editor or in the observations special requirements section.

• Two types of links:
  1. Timing
  2. Position Angle
Explicit Special Requirement – Links

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After Observation Link
• Scheduling one observation to follow another observation within an interval of time

Group/Sequence
• If you GROUP OBSERVATIONS, all visits of observations included in the observation list will execute in an order determined by the scheduling system

• If you SEQUENCE OBSERVATIONS, all visits of observations included in the observation list must be ordered according to their observation number

J-Dox: https://jwst-docs.stsci.edu/jppom/special-requirements/timing-special-requirements
If NON-INTERRUPTIBLE is selected, then all visits included must execute without interruption. (warning) The total duration of a non-interruptible group may not exceed 24 hours due to scheduling concerns.

EXCLUSIVE USE OF INSTRUMENT
This option is used to carry out an engineering procedure for a given instrument that requires two or more visits with a substantial time separation between the first and last. While the procedure is underway, no other visits using that instrument may be scheduled. An example is the NIRSpec MSA ANNEAL.
Explicit Special Requirement – Links

- There are two ways to add links to your program: in the observations link item in the tree editor or in the observations special requirements section.

- Two types of links:
  1. Timing
  2. Position Angle

  **Position Angle Offset Link**
  - Observation PA offset from another observation

  **Same Position Angle Link**
  - Two or more observations will execute at the same position angle

J-Dox: [https://jwst-docs.stsci.edu/jppom/special-requirements/aperture-position-angle-special-requirements](https://jwst-docs.stsci.edu/jppom/special-requirements/aperture-position-angle-special-requirements)
Position Angle Link Special Requirements in APT

PA Offset Link

- Orient observation: NIRISS (Obs 1)
- Offset from: None Selected
- Min PA offset: Degrees
- Max PA offset: Degrees
- Reference axis: Aperture

Aperture PA Offset 1 from <None specified>

OK

Same PA Link

- Observation list:
  - NIRISS (Obs 1)
  - MIRI Mosaic (Obs 2)
- Reference axis: Aperture

Same Aperture PA 1

OK