SOFIA Keywords Dictionary

[ Version: REV L] [Date: 1-25-2023 ]

FITS Keywords Table

All FITS files submitted to the DCS for archiving must adhere to the FITS standard (v3.0, 2008 July 10)

WCS Keywords (see Array Detector Keywords section) should adhere to standard conventions (see http://fits.gsfc.nasa.gov/fits_wcs.html and http://tdc-www.harvard.edu/wcstools/wcstools.fits.html for discussion and references).

Parameter: Keyword parameter, may not be the same as the shorter FITS keyword name
Comment: Short description of keyword - suitable for FITS comment fields. Long descriptions can be found in the detailed descriptions. Comment text should include units as well.
HDU: header data unit - where the keyword can be used in the FITS file.
Representation: How the value of the keyword should be represented. In simple cases this may just be 'string' or 'float', but more complicated formats can be specified here (e.g. date and time)
Type: Specific FITS type - integer, float, string, or logical (boolean).
Units: Required units for keyword, if applicable.
Range: Possible keyword values, including enumerated types.
Example: Value example.
Is Required: Condition for which the keyword is required
  -- If "Yes (Absolutely)", then the keywords are required for archive ingestion: If any of these is missing, the host file must be corrected and then re-ingested.
  -- If it is "Yes", then the keywords are needed for data processing or archive search: If any of these is missing, the files can still be ingested into the archive, but it will impact pipeline and searching.
  -- Conditionally required keywords are those that are only required if the stated condition applies, (e.g. DETCHAN is required if the instrument is FORCAST or FIFI-LS)
Source: Provider and location, if blank then data provided by SI. Known pre-defined aliases for some of the MCCS HK and TA HK data items are included. We recommend the SI developers assign custom aliases to the others as well for ease of reference.
  -- SI: Science Instrument
  -- FITS: Other FITS
  -- DCS: Observing Plan - approved proposals
  -- DCS: AOR - AORs defined in Observing Plan
  -- DCS: DCS assignid value
  -- SSC: SOFIA science center assigned value

Missing Data Sources: If the HK datanode is not available, or returns NotFound (or any other error), then the following values should be used to populate the corresponding FITS keyword based on the FITS keyword datatype (float, int, str, bool): FLOAT = -9999.0; INT = -9999; STRING = UNKNOWN; BOOL = defined on keyword by keyword basis. For missing RA and Dec values, use the string representation with "UNKNOWN".

### Observation Keywords

<table>
<thead>
<tr>
<th><strong>Parameter</strong></th>
<th><strong>FITS Keyword</strong></th>
<th><strong>Comment</strong></th>
<th><strong>HDU</strong></th>
<th><strong>Representation</strong></th>
<th><strong>Type</strong></th>
<th><strong>Units</strong></th>
<th><strong>Range</strong></th>
<th><strong>Example</strong></th>
<th><strong>Is Required</strong></th>
<th><strong>Source</strong></th>
</tr>
</thead>
</table>

1
<table>
<thead>
<tr>
<th><strong>Datasource</strong></th>
<th><strong>DATASRC</strong></th>
<th><strong>Data Source</strong></th>
<th><strong>primary</strong></th>
<th><strong>[string]</strong></th>
<th><strong>str</strong></th>
<th><strong>enum [ ASTRO, CALIBRATION, LAB, TEST, OTHER, FIRSTPOINT]</strong></th>
<th><strong>['ASTRO']</strong></th>
<th><strong>Yes</strong> <em>(Absolutely)</em></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ObservationType</strong></td>
<td><strong>OBSTYPE</strong></td>
<td><strong>Observation type, added STANDARD_WAVECAL in revG for FIFI-LS</strong></td>
<td><strong>any</strong></td>
<td><strong>[string]</strong></td>
<td><strong>str</strong></td>
<td><strong>enum [ OBJECT, STANDARD_FLUX, STANDARD_TELLURIC, LAMP, FLAT, DARK, BIAS, SKY, BB, GASCELL, LASER, FOCUS_LOOP, STANDARD_WAVECAL]</strong></td>
<td><strong>['OBJECT']</strong></td>
<td><strong>Yes</strong></td>
</tr>
<tr>
<td><strong>SourceType</strong></td>
<td><strong>SRCTYPE</strong></td>
<td><strong>Source type, added COMPACT_SOURCE in revG</strong></td>
<td><strong>any</strong></td>
<td><strong>[string]</strong></td>
<td><strong>str</strong></td>
<td><strong>enum [ POINT_SOURCE, EXTENDED_SOURCE, COMPACT_SOURCE, OTHER, UNKNOWN]</strong></td>
<td><strong>['POINT_SOURCE']</strong></td>
<td><strong>Yes</strong></td>
</tr>
<tr>
<td><strong>ObservationStatus</strong></td>
<td><strong>OBSSTAT</strong></td>
<td><strong>Observation status</strong></td>
<td><strong>primary</strong></td>
<td><strong>[string]</strong></td>
<td><strong>str</strong></td>
<td><strong>enum [ OK, ERROR ]</strong></td>
<td><strong>['OK']</strong></td>
<td><strong>If entered by SI</strong></td>
</tr>
<tr>
<td><strong>KeywordDictionaryVersion</strong></td>
<td><strong>KWDICT</strong></td>
<td><strong>SOFIA Keyword dictionary version, DCS ICD rev.</strong></td>
<td><strong>primary</strong></td>
<td><strong>[string]</strong></td>
<td><strong>str</strong></td>
<td><strong>[]</strong></td>
<td><strong>['DCS_SI_01_A']</strong></td>
<td><strong>Yes</strong></td>
</tr>
<tr>
<td><strong>ObservationID</strong></td>
<td><strong>OBS_ID</strong></td>
<td><strong>SOFIA Observation Identification</strong></td>
<td><strong>any</strong></td>
<td><strong>[MMMMMM_[C]nnn]</strong></td>
<td><strong>str</strong></td>
<td><strong>[]</strong></td>
<td><strong>['2011-06-08_F064B0187']</strong></td>
<td><strong>Yes</strong> <em>(Absolutely)</em></td>
</tr>
<tr>
<td><strong>ImageID</strong></td>
<td><strong>IMAGEID</strong></td>
<td><strong>Image identification index</strong></td>
<td><strong>extension</strong></td>
<td><strong>[integer]</strong></td>
<td><strong>int</strong></td>
<td><strong>[]</strong></td>
<td><strong>[1]</strong></td>
<td><strong>Multiple images in a single file for an observation, e.g. dithering, mapping, etc...</strong></td>
</tr>
<tr>
<td><strong>ObjectName</strong></td>
<td><strong>OBJECT</strong></td>
<td><strong>Object Name</strong></td>
<td><strong>any</strong></td>
<td><strong>[string]</strong></td>
<td><strong>str</strong></td>
<td><strong>[]</strong></td>
<td><strong>['Orion Nebula (M42)']</strong></td>
<td><strong>Yes</strong></td>
</tr>
<tr>
<td><strong>NAIF_ID</strong></td>
<td><strong>NAIF_ID</strong></td>
<td><strong>Object Name</strong></td>
<td><strong>any</strong></td>
<td><strong>[integer]</strong></td>
<td><strong>int</strong></td>
<td><strong>[]</strong></td>
<td><strong>[599]</strong></td>
<td><strong>Non-sidereal target</strong></td>
</tr>
<tr>
<td><strong>AOTUniqueID</strong></td>
<td><strong>AOT_ID</strong></td>
<td><strong>Astronomical Observation Template Identifier, most SI already use the correct format, clarified in revF</strong></td>
<td><strong>any</strong></td>
<td><strong>[string]</strong></td>
<td><strong>str</strong></td>
<td><strong>[]</strong></td>
<td><strong>['FLITECAM_Imaging AOT SCI-US-ICD-SE03-2044, revB, AOT_FORCAST_GRISM SCI-US-ICD-SE03-2001 Rev. D']</strong></td>
<td><strong>If AOT in use.</strong></td>
</tr>
<tr>
<td><strong>AORUniqueID</strong></td>
<td><strong>AOR_ID</strong></td>
<td><strong>Astronomical Observation Request Identifier. Clarified format in revF to be [PLANID]_n, n is an integer from 1 to 9999</strong></td>
<td><strong>any</strong></td>
<td><strong>[PLANID_n]</strong></td>
<td><strong>str</strong></td>
<td><strong>[]</strong></td>
<td><strong>['02_0103_128']</strong></td>
<td><strong>If observation associated with DCS AOR</strong></td>
</tr>
<tr>
<td><strong>FileGroupID</strong></td>
<td><strong>FILEGPID</strong></td>
<td><strong>File group identifier.</strong></td>
<td><strong>primary</strong></td>
<td><strong>[string]</strong></td>
<td><strong>str</strong></td>
<td><strong>[]</strong></td>
<td><strong>['ORIONMAP_20040101']</strong></td>
<td><strong>SI</strong></td>
</tr>
<tr>
<td><strong>FileGroupB</strong></td>
<td><strong>FILEGP_B</strong></td>
<td><strong>File group identifier for the BLUE/SW filter for FIFI-LS and FORCAST</strong></td>
<td><strong>primary</strong></td>
<td><strong>[string]</strong></td>
<td><strong>str</strong></td>
<td><strong>[]</strong></td>
<td><strong>['ORIONMAP_20040101']</strong></td>
<td><strong>SI</strong></td>
</tr>
</tbody>
</table>
### Data Processing Related Keywords

<table>
<thead>
<tr>
<th>Parameter</th>
<th>FITS Keyword</th>
<th>Comment</th>
<th>HDU</th>
<th>Representation</th>
<th>Type</th>
<th>Units</th>
<th>Range</th>
<th>Example</th>
<th>Is Required</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASSC_MSN</td>
<td>ASSC_MSN</td>
<td>List of Mission IDs used in generating a combined output file, added in revG</td>
<td>any</td>
<td>[MID_n,MID_n]</td>
<td>[str]</td>
<td></td>
<td>[]</td>
<td>['2011-06-08_FO_F06, 2011-06-08_FO_F07']</td>
<td>LEVEL 2/3/4</td>
<td>DCS only :</td>
</tr>
<tr>
<td>ASSC_FRQ</td>
<td>ASSC_FRQ</td>
<td>List of all frequencies used in generating a combined output file, added in revG</td>
<td>any</td>
<td>[float]</td>
<td>[flt]</td>
<td>GHz</td>
<td>[]</td>
<td>['1900.54, 1496.92']</td>
<td>LEVEL 2/3/4</td>
<td>DCS only :</td>
</tr>
<tr>
<td>ProcessingStatus</td>
<td>PROCSTAT</td>
<td>Processing status, required for all SI starting revF</td>
<td>primary</td>
<td>[string]</td>
<td>[str]</td>
<td></td>
<td>['LEVEL_0', 'LEVEL_1', 'LEVEL_2', 'LEVEL_3', 'LEVEL_4']</td>
<td>['LEVEL_1']</td>
<td>Required for all SI, FLITECAM already has</td>
<td></td>
</tr>
<tr>
<td>HeaderStatus</td>
<td>HEADSTAT</td>
<td>Header status, added MODIFIED in revF</td>
<td>primary</td>
<td>[string]</td>
<td>[str]</td>
<td></td>
<td>['ORIGINAL', 'UNKNOWN', 'CORRECTED', 'ERROR', 'MODIFIED']</td>
<td>['ORIGINAL']</td>
<td>Yes</td>
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<tr>
<td>DataQuality</td>
<td>DATAQUAL</td>
<td>Result of data processing, replaced the old DataQualityAssessment</td>
<td>primary</td>
<td>[string]</td>
<td>[str]</td>
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<td>['NOMINAL', 'FAIL']</td>
<td>['NOMINAL']</td>
<td>LEVEL 2/3/4 Product.</td>
<td></td>
</tr>
<tr>
<td>NumberOfSpectral</td>
<td>N_SPEC</td>
<td>Number of spectra included in file. (GREAT only)</td>
<td>primary</td>
<td>[integer]</td>
<td>[int]</td>
<td></td>
<td>[]</td>
<td>[]</td>
<td>Yes</td>
<td>Pipeline :</td>
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<tr>
<td>AssociatedAORIDs</td>
<td>ASSC_AOR</td>
<td>List of Astronomical Observation Request Identifiers.</td>
<td>any</td>
<td>[PLANID_n,PLANID_n]</td>
<td>[str]</td>
<td></td>
<td>[]</td>
<td>['02_0103_1.03_0098_127']</td>
<td>LEVEL 2/3/4</td>
<td>DCS : Observing Plan</td>
</tr>
<tr>
<td>PipelineName</td>
<td>PIPELINE</td>
<td>Pipeline/Processing Software</td>
<td>primary</td>
<td>[string]</td>
<td>[str]</td>
<td></td>
<td>[]</td>
<td>['FDRP v1.0.0']</td>
<td>LEVEL 2/3/4</td>
<td>Pipeline :</td>
</tr>
<tr>
<td>PipelineVersion</td>
<td>PIPEVERS</td>
<td>Pipeline Version, full tag.</td>
<td>primary</td>
<td>[string]</td>
<td>[str]</td>
<td></td>
<td>[]</td>
<td>['FDRP_1.0.0_UT2013_4_1']</td>
<td>LEVEL 2/3/4</td>
<td>Pipeline :</td>
</tr>
<tr>
<td>ProductType</td>
<td>PRODTYPE</td>
<td>Product type.</td>
<td>primary</td>
<td>[string]</td>
<td>[str]</td>
<td></td>
<td>[]</td>
<td>['DRIP-COADDED']</td>
<td>LEVEL 2/3/4</td>
<td>Pipeline :</td>
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<tr>
<td>DCSFileRevision</td>
<td>FILEREV</td>
<td>File revision identifier.</td>
<td>primary</td>
<td>[string]</td>
<td>[str]</td>
<td></td>
<td>[]</td>
<td>['r2']</td>
<td>If file changed in post-processing.</td>
<td></td>
</tr>
</tbody>
</table>

### Mission Management Keywords

SOFIA FITS Keyword revL January 2023
### Observing Plan Unique ID
- **Parameter**: ObservingPlanUniqueID
- **FITS Keyword**: PLANID
- **Comment**: Observing plan identification
- **HDU**: primary
- **Representation**: [string]
- **Type**: [str]
- **Units**: [str]
- **Range**: [str]
- **Example**: ['81_0131']
- **Is Required**: If observation associated with an observing plan.
- **Source**: DCS : Observing Plan

### Aircraft Deployment
- **Parameter**: AircraftDeployment
- **FITS Keyword**: DEPLOY
- **Comment**: Site deployment
- **HDU**: primary
- **Representation**: [string]
- **Type**: [str]
- **Units**: [str]
- **Range**: [str]
- **Example**: ['DAOF']
- **Is Required**: Yes
- **Source**: SSC : Mission Plan

### Mission ID
- **Parameter**: MissionID
- **FITS Keyword**: MISSN-ID
- **Comment**: Mission ID
- **HDU**: primary
- **Representation**: [string]
- **Type**: [str]
- **Units**: [str]
- **Range**: [str]
- **Example**: ['2011-06-08_F0_F06']
- **Is Required**: Yes (Absolutely)*
- **Source**: MCCS : session.user_environment.mission_id

### Flight Leg
- **Parameter**: FlightLeg
- **FITS Keyword**: FLIGHTLG
- **Comment**: Flight leg, updated to ftxexec.data from exec.data
- **HDU**: primary
- **Representation**: [integer]
- **Type**: [int]
- **Units**: [int]
- **Range**: [int]
- **Example**: [4]
- **Is Required**: Yes
- **Source**: MCCS : ftxexec.ftxexec.data.leg_seq

### Origination Keywords

<table>
<thead>
<tr>
<th>Parameter</th>
<th>FITS Keyword</th>
<th>Comment</th>
<th>HDU</th>
<th>Representation</th>
<th>Type</th>
<th>Units</th>
<th>Range</th>
<th>Example</th>
<th>Is Required</th>
<th>Source</th>
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<tbody>
<tr>
<td>Origin</td>
<td>ORIGIN</td>
<td>Origin of FITS file.</td>
<td>primary</td>
<td>[string]</td>
<td>[str]</td>
<td></td>
<td></td>
<td>[FORCAST -- Cornell Univ.]</td>
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<td>:</td>
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<tr>
<td>Observers</td>
<td>OBSERVER</td>
<td>Observer(s)</td>
<td>primary</td>
<td>[string]</td>
<td>[str]</td>
<td></td>
<td></td>
<td>['Jane Astro']</td>
<td>Yes</td>
<td>:</td>
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<tr>
<td>FileCreator</td>
<td>CREATOR</td>
<td>File creation task (with version info).</td>
<td>primary</td>
<td>[string]</td>
<td>[str]</td>
<td></td>
<td></td>
<td>['Mauna Kea IR']</td>
<td>Yes</td>
<td>:</td>
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<tr>
<td>TelescopeOperator</td>
<td>OPERATOR</td>
<td>Telescope operator</td>
<td>primary</td>
<td>[string]</td>
<td>[str]</td>
<td></td>
<td></td>
<td>['Joe Astro']</td>
<td>Yes</td>
<td>SSC : Mission Plan</td>
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<tr>
<td>Filename</td>
<td>FILENAME</td>
<td>Name of host file</td>
<td>primary</td>
<td>[string]</td>
<td>[str]</td>
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<td>[040101_077_05FL001.fits]</td>
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</tr>
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</table>

### Date and Time Keywords

<table>
<thead>
<tr>
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<th>FITS Keyword</th>
<th>Comment</th>
<th>HDU</th>
<th>Representation</th>
<th>Type</th>
<th>Units</th>
<th>Range</th>
<th>Example</th>
<th>Is Required</th>
<th>Source</th>
</tr>
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<tbody>
<tr>
<td>CreationDate</td>
<td>DATE</td>
<td>Date of file creation</td>
<td>any</td>
<td>[yyyy-mm-ddThh:mm:ss[.sss]]</td>
<td>[str]</td>
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<td>[2004-01-01T13:45:45.2]</td>
<td>Yes</td>
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<tr>
<td>ObservationDate</td>
<td>DATE-OBS</td>
<td>UTC Date of exposure start</td>
<td>any</td>
<td>[yyyy-mm-ddThh:mm:ss[.sss]]</td>
<td>[str]</td>
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<td></td>
<td>[2004-01-01T12:11:10.5]</td>
<td>Yes (Absolutely)*</td>
<td>:</td>
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<tr>
<td>ObservationStartUTC</td>
<td>UCTSTART</td>
<td>UTC of exposure start</td>
<td>any</td>
<td>[hh:mm:ss.s]</td>
<td>[str]</td>
<td></td>
<td></td>
<td>[09:30:01.00]</td>
<td>Yes</td>
<td>:</td>
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<td>ObservationEndUTC</td>
<td>UTCEND</td>
<td>UTC of exposure end</td>
<td>any</td>
<td>[hh:mm:ss.s]</td>
<td>[str]</td>
<td></td>
<td></td>
<td>[09:30:01.00]</td>
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### Environmental Keywords

<table>
<thead>
<tr>
<th>Parameter</th>
<th>FITS Keyword</th>
<th>Comment</th>
<th>HDU</th>
<th>Representation</th>
<th>Type</th>
<th>Units</th>
<th>Range</th>
<th>Example</th>
<th>Is Required</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>WaterVaporZenith_Start</td>
<td>WVZ_STA</td>
<td>Water vapor, integrated to zenith, observation start.</td>
<td>any</td>
<td>[general]</td>
<td>[ft]</td>
<td>microns</td>
<td>gt [0.0]</td>
<td>[ 1.503]</td>
<td>Yes</td>
<td>MCCS : wvm_if.wvmdata.water_vapor</td>
</tr>
<tr>
<td>WaterVaporZenith_End</td>
<td>WVZ_END</td>
<td>Water vapor, integrated to zenith, observation end.</td>
<td>any</td>
<td>[general]</td>
<td>[ft]</td>
<td>microns</td>
<td>gt [0.0]</td>
<td>[ 1.634]</td>
<td>Yes</td>
<td>MCCS : wvm_if.wvmdata.water_vapor</td>
</tr>
</tbody>
</table>
### Aircraft Keywords

<table>
<thead>
<tr>
<th>Parameter</th>
<th>FITS Keyword</th>
<th>Comment</th>
<th>HDU Representation</th>
<th>Type</th>
<th>Units</th>
<th>Range</th>
<th>Example</th>
<th>Is Required</th>
<th>Source</th>
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</thead>
<tbody>
<tr>
<td>Altitude_Start</td>
<td>ALTI_STA</td>
<td>Aircraft pressure altitude, start of observation.</td>
<td>any</td>
<td>[general]</td>
<td>[ft]</td>
<td>[ ]</td>
<td>[35229]</td>
<td>Yes</td>
<td>MCCS : das.ic1080_15hz.press_alt</td>
</tr>
<tr>
<td>Altitude_End</td>
<td>ALTI_END</td>
<td>Aircraft pressure altitude, end of observation.</td>
<td>any</td>
<td>[general]</td>
<td>[ft]</td>
<td>[ ]</td>
<td>[35128]</td>
<td>Yes</td>
<td>MCCS : das.ic1080_15hz.press_alt</td>
</tr>
<tr>
<td>Airspeed</td>
<td>AIRSPEED</td>
<td>True aircraft airspeed.</td>
<td>any</td>
<td>[general]</td>
<td>[ft]</td>
<td>[ ]</td>
<td>[375.0]</td>
<td>Yes</td>
<td>MCCS : das.ic1080_10hz.true_airspeed</td>
</tr>
<tr>
<td>GroundSpeed</td>
<td>GRDSPEED</td>
<td>Aircraft ground speed.</td>
<td>any</td>
<td>[general]</td>
<td>[ft]</td>
<td>[ ]</td>
<td>[350.0]</td>
<td>Yes</td>
<td>MCCS : das.ic1080_2hz.ground_speed</td>
</tr>
<tr>
<td>Latitude_Start</td>
<td>LAT_STA</td>
<td>Aircraft latitude, start of observation.</td>
<td>any</td>
<td>[general]</td>
<td>[ft]</td>
<td>Degrees [ ]</td>
<td>[35.2567]</td>
<td>Yes</td>
<td>MCCS : das.ic1080_2hz.lat_fms_1</td>
</tr>
<tr>
<td>Longitude_Start</td>
<td>LON_STA</td>
<td>Aircraft longitude, start of observation.</td>
<td>any</td>
<td>[general]</td>
<td>[ft]</td>
<td>Degrees [ ]</td>
<td>[35.2567]</td>
<td>Yes</td>
<td>MCCS : das.ic1080_2hz.lon_fms_1</td>
</tr>
<tr>
<td>Latitude_End</td>
<td>LAT_END</td>
<td>Aircraft latitude, end of observation.</td>
<td>any</td>
<td>[general]</td>
<td>[ft]</td>
<td>Degrees [ ]</td>
<td>[35.2567]</td>
<td>Yes</td>
<td>MCCS : das.ic1080_2hz.lat_fms_1</td>
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<tr>
<td>Longitude_End</td>
<td>LON_END</td>
<td>Aircraft longitude, end of observation.</td>
<td>any</td>
<td>[general]</td>
<td>[ft]</td>
<td>Degrees [ ]</td>
<td>[35.2567]</td>
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<td>Heading</td>
<td>HEADING</td>
<td>Aircraft true heading.</td>
<td>any</td>
<td>[general]</td>
<td>[ft]</td>
<td>Degrees [ ]</td>
<td>[10.7892]</td>
<td>Yes</td>
<td>MCCS : das.ic1080_2hz.true_heading</td>
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<td>TrackAngle</td>
<td>TRACKANG</td>
<td>Aircraft track angle.</td>
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<td>[general]</td>
<td>[ft]</td>
<td>Degrees [ ]</td>
<td>[10.7892]</td>
<td>Yes</td>
<td>MCCS : das.ic1080_2hz.true_track_angle</td>
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### Telescope Keywords

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<tr>
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<td>Telescope</td>
<td>TELESCOP</td>
<td>Telescope name</td>
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<td>[str]</td>
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<td>'SOFIA 2.5m'</td>
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<td>TelescopeConfig</td>
<td>TELCONF</td>
<td>Telescope configuration</td>
<td>primary</td>
<td>[string]</td>
<td>[str]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>Yes</td>
<td>SSC : Mission Plan</td>
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<tr>
<td>TelescopeRA</td>
<td>TELRA</td>
<td>Updated in revH:SI Boresight astrometric RA (not including aberration or refraction effects, but including parallax, proper)</td>
<td>any</td>
<td>[general]</td>
<td>[hh:mm:ss.s]</td>
<td>[ ]</td>
<td>9.023456 [5:35:17.3]</td>
<td>Yes</td>
<td>MCCS : coord.pos.sibs.ra</td>
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<tr>
<td>TelescopeDec</td>
<td>TELDEC</td>
<td>Updated in revH:  SI Boresight astrometric RA (not including aberration or refraction effects, but including parallax, proper motion, and precession to J2000) – as returned by MCCS in the coord.pos.sibs.ra HK; see ‘Observing Effects’ in MCCS_SI_04”</td>
<td>any</td>
<td>[general]</td>
<td>[ft]</td>
<td>decimal degrees</td>
<td>interval [-90,90]</td>
<td>[47.345789]</td>
<td>[-5:23:28]</td>
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<tr>
<td>TelescopeVPA</td>
<td>TELVPA</td>
<td>SI Boresight VPA (ICRS J2000) - as returned by MCCS, Clarified in revG: ROF (given in the flight plans) is the Zenith PA (from North through East). For EXES it means that slit PA=ROF+270.</td>
<td>any</td>
<td>[general]</td>
<td>[ft]</td>
<td>decimal degrees</td>
<td>interval [0,360]</td>
<td>[255.05]</td>
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<tr>
<td>TelescopeFocus_Start</td>
<td>FOCUS_ST</td>
<td>Telescope focus - SMA FCM t position (microns), observation start. Source changed from MCCS to TA in revG.1</td>
<td>any</td>
<td>[general]</td>
<td>[ft]</td>
<td>microns</td>
<td>interval [-5000,5000]</td>
<td>[1245]</td>
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<td>TelescopeFocus_End</td>
<td>FOCUS_EN</td>
<td>Telescope focus - SMA FCM t position (microns), observation end. Source changed from MCCS to TA in revG.1</td>
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<td>[general]</td>
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<td>microns</td>
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<td>[1322]</td>
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<td>TelescopeElevation</td>
<td>TELEL</td>
<td>Telescope elevation above the horizon at observation start - as returned by MCCS. Changed source from coord.pos.sibs.alt to coord.pos.sibs.alt in revF:</td>
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<td>interval [0,90]</td>
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<td>TelescopeCrossElevation</td>
<td>TELXEL</td>
<td>Telescope cross elevation at observation start - as returned by MCCS</td>
<td>any</td>
<td>[general]</td>
<td>[ft]</td>
<td>decimal degrees</td>
<td>interval [-90,90]</td>
<td>[0.543]</td>
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<tr>
<td>TelescopeLineOfSight</td>
<td>TELLOS</td>
<td>Telescope LOS at observation start - as returned by MCCS</td>
<td>any</td>
<td>[general]</td>
<td>[ft]</td>
<td>decimal degrees</td>
<td>interval [-180,180]</td>
<td>[0.543]</td>
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<tr>
<td>TascuStatus</td>
<td>TSC-STAT</td>
<td>TASCU Status at observation end.</td>
<td>any</td>
<td>[string (TBC)]</td>
<td>[str]</td>
<td>[]</td>
<td>[STAB_INERTIAL_ONGOING]</td>
<td>Yes</td>
<td>MCCS : ta_state.tsc_status</td>
</tr>
</tbody>
</table>
**TasculFBCStatus**

FBC Status at observation end, source changed from MCCS to TA in revG.1

Any

```
[enum [FBC_OFF (1), FBC_QS (2), FBC_DY (3), FBC_ON (4)]]
```

Yes

**ObservationRequestRA**

OBSRA

RA - requested

Any

```
[general [hh:mm:ss.s]]
```

Hours

Interval [0,24]

Yes

**ObservationRequestDec**

OBSDEC

Dec - requested

Any

```
[general [dd:mm:ss.s]]
```

Degrees

Interval [-90,90]

Yes

**ObservationRequestEquinox**

EQUINOX

Coordinate equinox for OBSRA and OBSDEC

Any

```
[general [ft yr]]
```

Yr

Interval [0,24]

Yes

**ZenithAngle_Start**

ZA_START

Telescope zenith angle, start of observation.

Any

```
[general [ft]]
```

Decimal degrees

Interval [0,90]

Yes

**ZenithAngle_End**

ZA_END

Telescope zenith angle, end of observation.

Any

```
[general [ft]]
```

Decimal degrees

Interval [0,90]

Yes

**TrackingMode**

TRACMODE

SOFIA tracking mode, reduced from 9 to 5 modes based on MCCS-SI_04 revL

Any

```
[string]
```

Enum [ OFFSET, ROF, LIMB, OFFSET, ROF+OFFSET ]

"OFFSET"

Tracking

MCCS : ta_pos.track.state

**TrackingError**

TRACERR

Tracking error flag.

Any

```
[boolean [log]]
```

[]

F

Tracking

MCCS : ta_trc.trc_status_table.main_op_mode_id

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### Data Collection Keywords

<table>
<thead>
<tr>
<th>Parameter</th>
<th>FITS Keyword</th>
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<tr>
<td>isChopping</td>
<td>CHOPPING</td>
<td>Chopping flag</td>
<td>primary</td>
<td>[boolean [log]]</td>
<td>[T]</td>
<td>If mode in use.</td>
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<td></td>
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<td>isNodding</td>
<td>NODDING</td>
<td>Nodding flag</td>
<td>primary</td>
<td>[boolean [log]]</td>
<td>[T]</td>
<td>If mode in use.</td>
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<td>DITHER</td>
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<td>If mode in use.</td>
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<td>If mode in use.</td>
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<td>[T]</td>
<td>If mode in use.</td>
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### Annotation Keywords

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<td>Comment</td>
<td>COMMENT</td>
<td>Comments may be placed anywhere throughout the header.</td>
<td>any</td>
<td>[string [str]]</td>
<td>[ ]</td>
<td>&quot;[These data on ORION are GRRRRREAAAT!]&quot;)</td>
<td>If entered by SI or pipeline</td>
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<tr>
<td>History</td>
<td>HISTORY</td>
<td>Processing history information.</td>
<td>any</td>
<td>[string [str]]</td>
<td>[ ]</td>
<td>&quot;$FDRP - Redux0 (2004-01-01, 00:00:00) OUTPUT = FILENAME&quot;]</td>
<td>If entered by SI or pipeline</td>
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### Instrument Keywords

<table>
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<td>INSTRUME</td>
<td>Instrument</td>
<td>primary</td>
<td>[string]</td>
<td>[str]</td>
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<td>['FLITECAM']</td>
<td>Yes (Absolutely)*</td>
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<td></td>
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<td>Datatype</td>
<td>DATATYPE</td>
<td>Data type</td>
<td>primary</td>
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<td>[str]</td>
<td>enum</td>
<td>['IMAGE', 'SPECTRAL', 'OTHER']</td>
<td>['IMAGE']</td>
<td>Yes</td>
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<td>InstrumentConfiguration</td>
<td>INSTCFG</td>
<td>Instrument configuration</td>
<td>primary</td>
<td>[string]</td>
<td>[str]</td>
<td>[]</td>
<td>['IMAGING']</td>
<td>Yes</td>
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<td>InstrumentMode</td>
<td>INSTMODE</td>
<td>Instrument observing mode, added allow TOTAL_POWER in revG, requested by pipeline</td>
<td>primary</td>
<td>[string]</td>
<td>[str]</td>
<td>[]</td>
<td>['C2N', 'MAPPING', 'TOTAL_POWER']</td>
<td>Yes</td>
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<td>MCCSMode</td>
<td>MCCSMODE</td>
<td>MCCS SI Mode (MCCS_SI_04).</td>
<td>primary</td>
<td>[string]</td>
<td>[str]</td>
<td>[]</td>
<td>['flitecam_imaging']</td>
<td>Yes</td>
<td>MCCS : (instrument).si_config.current_mode</td>
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<td>ExposureTime</td>
<td>EXPTIME</td>
<td>On-source exposure time</td>
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<td>[general]</td>
<td>[flt]</td>
<td>s</td>
<td>[600]</td>
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<tr>
<td>SpectralElement1</td>
<td>SPECTEL1</td>
<td>First spectral element in use -- Clarified in revF, set to &quot;NONE&quot; if not in use.</td>
<td>any</td>
<td>[string]</td>
<td>[str]</td>
<td>[]</td>
<td>['FLT_F']</td>
<td>Yes (Absolutely)*</td>
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<td>SpectralElement2</td>
<td>SPECTEL2</td>
<td>Second spectral element in use -- Set to &quot;NONE&quot; if not in use.</td>
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<td>[string]</td>
<td>[str]</td>
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<td>['FOR_XG063']</td>
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<td>InstrumentSlit</td>
<td>SLIT</td>
<td>Instrument slit in use.</td>
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<td>[string]</td>
<td>[str]</td>
<td>[]</td>
<td>['FOR_SS24']</td>
<td>Spectroscopy configs: if slit in use.</td>
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<td>WavelengthCentral</td>
<td>WAVECENT</td>
<td>Central wavelength of observation.</td>
<td>primary</td>
<td>[general]</td>
<td>[flt]</td>
<td>Microns</td>
<td>[2.2]</td>
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<td>Resolution</td>
<td>RESOLUN</td>
<td>Spectral resolution of observation.</td>
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<td>DetectorChannel</td>
<td>DETCHAN</td>
<td>The values are FORCAST: SW</td>
<td>LW , FIFI-LS: BLUE</td>
<td>RED</td>
<td>primary</td>
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<td>[str]</td>
<td>enum</td>
<td>['SW', 'LW', 'BLUE', 'RED']</td>
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<td>TotalIntegrationTime</td>
<td>TOTINT</td>
<td>Total integration time (s), for FORCAST, IF SKYMODE is C2NC2 or NXCAC, then TOTINT =</td>
<td>any</td>
<td>[float]</td>
<td>[flt]</td>
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**Array Detector Keywords**

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<td>PixelScale</td>
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<td>ScienceInstrumentBoresightX</td>
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<td>SI Boresight (x) - as returned by MCCS, typo in name fixed</td>
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<td>CTYPEn</td>
<td>Axis type (8 characters)</td>
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<td>WCS_CRPIX</td>
<td>CRPIXn</td>
<td>Array location of the reference point in pixels for the n-th axis. Changed from int to float in revF</td>
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<td>WCS_CVAL</td>
<td>CRVAln</td>
<td>Coordinate value at reference point for the n-th axis.</td>
<td>any</td>
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<td>[ft]</td>
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<td>WCS_CDELT</td>
<td>CDELTn</td>
<td>Plate scale for the n-th axis at reference point (deg/pixel).</td>
<td>any</td>
<td>[ft]</td>
<td>[ft]</td>
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<td>[1.3852E-4]</td>
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<td>WCS_CROTA2</td>
<td>CROTA2</td>
<td>Rotation of axes in degrees.</td>
<td>any</td>
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<td>[113.45]</td>
<td>Imaging only.</td>
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<td>WCS_RotMatrix</td>
<td>CDi_j</td>
<td>WCS Rotation Matrix elements.</td>
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**Heterodyne Keywords**

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<th>Is Required</th>
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<tbody>
<tr>
<td>FrontendDevice</td>
<td>FRONTEND</td>
<td>Name of frontend device.</td>
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<td>BANDWID</td>
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<td>primary</td>
<td>[general]</td>
<td>[ft]</td>
<td>MHz</td>
<td>[300.547]</td>
<td>Heterodyne instruments only.</td>
<td></td>
<td>SOFIA</td>
</tr>
<tr>
<td>SystemTemperature</td>
<td>TSYS</td>
<td>System temperature.</td>
<td>primary</td>
<td>[general]</td>
<td>[ft]</td>
<td>K</td>
<td>[10.5]</td>
<td>Heterodyne instruments only.</td>
<td></td>
<td>SOFIA</td>
</tr>
<tr>
<td>FrequencyResolution</td>
<td>FREQRES</td>
<td>Nominal frequency resolution -- may differ from channel spacing.</td>
<td>primary</td>
<td>[general]</td>
<td>[ft]</td>
<td>MHz</td>
<td>[100.0]</td>
<td>Heterodyne instruments only.</td>
<td></td>
<td>SOFIA</td>
</tr>
<tr>
<td>ReferenceFrequency</td>
<td>OBSFREQ</td>
<td>Reference frequency.</td>
<td>primary</td>
<td>[general]</td>
<td>[ft]</td>
<td>MHz</td>
<td>[]</td>
<td>Heterodyne instruments only.</td>
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<td>SOFIA</td>
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</table>
### Data Structure Keywords

<table>
<thead>
<tr>
<th>Parameter</th>
<th>FITS Keyword</th>
<th>Comment</th>
<th>HDU</th>
<th>Representation</th>
<th>Type</th>
<th>Units</th>
<th>Range</th>
<th>Example</th>
<th>Is Required</th>
<th>Source</th>
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</table>

### Chopping Keywords

<table>
<thead>
<tr>
<th>Parameter</th>
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<th>Units</th>
<th>Range</th>
<th>Example</th>
<th>Is Required</th>
<th>Source</th>
</tr>
</thead>
</table>

**Sideband Frequency**
- **IMAGFREQ**: Image sideband frequency.
  - **primary**: [general]
  - **type**: MHz
  - **range**: []
  - **example**: []
  - **source**: Heterodyne instruments only.

**Rest Frequency**
- **RESTFREQ**: Rest frequency.
  - **primary**: [general]
  - **type**: MHz
  - **range**: []
  - **example**: []
  - **source**: Heterodyne instruments only.

**Velocity Definition**
- **VELDEF**: Velocity Definition
  - **primary**: [string]
  - **range**: ["RADI-LSR"]

**Velocity Frame**
- **VFRAME**: Radial velocity of reference frame.
  - **primary**: [general]
  - **type**: km/s
  - **range**: [250.3]

**Radial Velocity**
- **RVSYS**: Radial velocity.
  - **primary**: [general]
  - **type**: km/s
  - **range**: [22.3]

**Data Structure Keywords**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>FITS Keyword</th>
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</table>

### Chopping Keywords

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<tr>
<th>Parameter</th>
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<th>Range</th>
<th>Example</th>
<th>Is Required</th>
<th>Source</th>
</tr>
</thead>
</table>

**Chopping Frequency**
- **CHPFREQ**: Chop frequency
  - **type**: MHz
  - **range**: [0.0, 20.0]

**Chopping Profile**
- **CHPPROF**: Chopping profile: 2 or 3 point
  - **type**: enum [2-POINT, 3-POINT]

**Chopping Symmetry**
- **CHPSYM**: Chopping symmetry
  - **type**: enum [0: no_chop] [2: asymmetric] [4: non_zero_tilt] [5: 2 point_symmetric] [9: 3 point_symmetric] [6: asymmetric_minus] [11: extreme_asymmetric_plus] [15: contrived]

**Chopping Amplitude 1**
- **CHPAMP1**: Chop amplitude 1
  - **type**: arcsec
  - **range**: [-1125.0, 1125.0]

**Chopping Amplitude 2**
- **CHPAMP2**: Chop amplitude 2
  - **type**: arcsec
  - **range**: [-1125.0, 1125.0]

**Chopping Coordinate System**
- **CHPCRSYS**: MCCS Coordinate system for sky tip, tilt, and angle
  - **type**: enum [TARF, ERF, SIRF]

**Chopping Angle**
- **CHPANGLE**: Calulated angle in the sky_coord sys reference frame
  - **type**: decimal degrees
  - **range**: [-360, 360]

**Chopping Tip**
- **CHPTIP**: Calulated tip in the sky_coord sys reference frame
  - **type**: arcsec
  - **range**: [-1125,1125]

**Chopping Tilt**
- **CHPTILT**: Calulated tilt in the sky_coord sys reference frame
  - **type**: arcsec
  - **range**: [-1125,1125]

**Chopping Phase**
- **CHPPHASE**: Chop phase, changed to float from int in revG
  - **type**: millisecond
  - **range**: [0,1000]

**SOFIA FITS Keyword revL January 2023**
## Nodding Keywords

<table>
<thead>
<tr>
<th>Parameter</th>
<th>FITS Keyword</th>
<th>Comment</th>
<th>HDU</th>
<th>Representation</th>
<th>Type</th>
<th>Units</th>
<th>Range</th>
<th>Example</th>
<th>Is Required</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>NodDwellTime</td>
<td>NODTIME</td>
<td>Nod time</td>
<td>any</td>
<td>[general]</td>
<td>[fl]</td>
<td>s</td>
<td>[ ]</td>
<td>[300.0]</td>
<td>Nodding :</td>
<td></td>
</tr>
<tr>
<td>NodCycles</td>
<td>NODN</td>
<td>Nod cycles</td>
<td>any</td>
<td>[integer]</td>
<td>[int]</td>
<td></td>
<td>[ ]</td>
<td>[30]</td>
<td>Nodding :</td>
<td></td>
</tr>
<tr>
<td>NodSettleTime</td>
<td>NODSETL</td>
<td>Nod settle time</td>
<td>any</td>
<td>[general]</td>
<td>[fl]</td>
<td>s</td>
<td>[ ]</td>
<td>[0.0556]</td>
<td>Nodding :</td>
<td></td>
</tr>
<tr>
<td>NodAmplitude</td>
<td>NODAMP</td>
<td>Nod amplitude on sky</td>
<td>any</td>
<td>[general]</td>
<td>[fl]</td>
<td>arcsec</td>
<td>[ ]</td>
<td>[30.0]</td>
<td>Nodding MCCS : nod.amplitude</td>
<td></td>
</tr>
<tr>
<td>NodBeam</td>
<td>NODBEAM</td>
<td>Current nod beam position</td>
<td>any</td>
<td>[string]</td>
<td>[str]</td>
<td></td>
<td>[ ]</td>
<td>['A']</td>
<td>Nodding MCCS : nod.current</td>
<td></td>
</tr>
<tr>
<td>NodPattern</td>
<td>NODPATT</td>
<td>Nodding pattern, one cycle. Added BA in revF, changed to allowing any String in revG requested by pipeline</td>
<td>any</td>
<td>[string]</td>
<td>[str]</td>
<td></td>
<td>[ ]</td>
<td>['ABBA','AB','BA','CUSTOM']</td>
<td>Nodding :</td>
<td></td>
</tr>
<tr>
<td>NodStyle</td>
<td>NODSTYLE</td>
<td>Chop/nod Style</td>
<td>any</td>
<td>[string]</td>
<td>[str]</td>
<td></td>
<td>[ ]</td>
<td>['NPC']</td>
<td>Nodding/Chopping :</td>
<td></td>
</tr>
<tr>
<td>NodCoordSys</td>
<td>NODCRSYS</td>
<td>Coordinate system for Nod angle</td>
<td>any</td>
<td>[string]</td>
<td>[str]</td>
<td></td>
<td>[ ]</td>
<td>['ERF']</td>
<td>Nodding MCCS : nod.coord.sys</td>
<td></td>
</tr>
<tr>
<td>NodAngle</td>
<td>NODANGLE</td>
<td>Nod angle, range increased in revF from +/-180 to +/-360</td>
<td>any</td>
<td>[general]</td>
<td>[fl]</td>
<td>decimal</td>
<td>interval [-360,360]</td>
<td>[45.0]</td>
<td>Nodding MCCS : nod.pos_angle</td>
<td></td>
</tr>
</tbody>
</table>

## Dithering Keywords

<table>
<thead>
<tr>
<th>Parameter</th>
<th>FITS Keyword</th>
<th>Comment</th>
<th>HDU</th>
<th>Representation</th>
<th>Type</th>
<th>Units</th>
<th>Range</th>
<th>Example</th>
<th>Is Required</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>DitherCoordinate</td>
<td>DTHCRSYS</td>
<td>Dither coordinate, needed by DPS for FORCAST, FLITECAM</td>
<td>any</td>
<td>[str]</td>
<td>[str]</td>
<td></td>
<td>enum [SIRF,TARF,ERF]</td>
<td>[SIRF]</td>
<td>Dithering SI1 DCS, not from MCCS :</td>
<td></td>
</tr>
<tr>
<td>DitherXOffset</td>
<td>DTHXOFF</td>
<td>Dither offset in X axis (arcseconds).</td>
<td>any</td>
<td>[float]</td>
<td>[flt]</td>
<td>arcsec</td>
<td>[ ]</td>
<td>[2.5]</td>
<td>Dithering :</td>
<td></td>
</tr>
<tr>
<td>DitherYOffset</td>
<td>DTHYOFF</td>
<td>Dither offset in Y axis (arcseconds).</td>
<td>any</td>
<td>[float]</td>
<td>[flt]</td>
<td>arcsec</td>
<td>[ ]</td>
<td>[2.5]</td>
<td>Dithering :</td>
<td></td>
</tr>
<tr>
<td>DitherPattern</td>
<td>DTHPATT</td>
<td>Dither pattern, added NONE in revF</td>
<td>any</td>
<td>[string]</td>
<td>[str]</td>
<td></td>
<td>enum [NONE, 3-POINT, 5-POINT, 9-POINT, CUSTOM ]</td>
<td>['9-POINT']</td>
<td>Dithering :</td>
<td></td>
</tr>
<tr>
<td>DitherPositions</td>
<td>DTHNPOS</td>
<td>Number of dither positions.</td>
<td>any</td>
<td>[integer]</td>
<td>[int]</td>
<td></td>
<td>[ ]</td>
<td>[9]</td>
<td>Dithering :</td>
<td></td>
</tr>
<tr>
<td>DitherPositionIndex</td>
<td>DTHINDEX</td>
<td>Dither position index.</td>
<td>any</td>
<td>[integer]</td>
<td>[int]</td>
<td></td>
<td>[ ]</td>
<td>[5]</td>
<td>Dithering :</td>
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## Mapping Keywords

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<tr>
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<th>Representation</th>
<th>Type</th>
<th>Units</th>
<th>Range</th>
<th>Example</th>
<th>Is Required</th>
<th>Source</th>
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<tbody>
<tr>
<td>Parameter</td>
<td>FITS Keyword</td>
<td>Comment</td>
<td>HDU</td>
<td>Representation</td>
<td>Type</td>
<td>Units</td>
<td>Range</td>
<td>Example</td>
<td>Is Required</td>
<td>Source</td>
</tr>
<tr>
<td>--------------------</td>
<td>--------------</td>
<td>----------------------------------------------</td>
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<td>-------</td>
<td>----------------</td>
<td>----------</td>
<td>-------------</td>
<td>--------</td>
</tr>
<tr>
<td>MapCoordSys</td>
<td>MAPCRSYS</td>
<td>Coordinate system for mapping/scanning.</td>
<td>any</td>
<td>[string]</td>
<td>[str]</td>
<td></td>
<td>enum [EQUATORIAL, GALACTIC, ECLIPTIC, USER]</td>
<td>['GALACTIC']</td>
<td>Mapping</td>
<td></td>
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<tr>
<td>MapPositionsX</td>
<td>MAPNXPOS</td>
<td>Number of map positions in X</td>
<td>any</td>
<td>[integer]</td>
<td>[int]</td>
<td></td>
<td>[]</td>
<td>[4]</td>
<td>Mapping</td>
<td></td>
</tr>
<tr>
<td>MapIntervalX</td>
<td>MAPINTX</td>
<td>Mapping step interval in X</td>
<td>primary</td>
<td>[general]</td>
<td>[flt]</td>
<td>arcmin</td>
<td>[]</td>
<td>(8.5)</td>
<td>Mapping</td>
<td></td>
</tr>
<tr>
<td>MapIntervalY</td>
<td>MAPINTY</td>
<td>Mapping step interval in Y</td>
<td>any</td>
<td>[general]</td>
<td>[flt]</td>
<td>arcmin</td>
<td>[]</td>
<td>(8.5)</td>
<td>Mapping</td>
<td></td>
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</tbody>
</table>

**Scanning Keywords (Constant Velocity)**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>FITS Keyword</th>
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<th>Representation</th>
<th>Type</th>
<th>Units</th>
<th>Range</th>
<th>Example</th>
<th>Is Required</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>ScanRate</td>
<td>SCNRATE</td>
<td>Scan rate</td>
<td>any</td>
<td>[general]</td>
<td>[flt]</td>
<td>arcsec/s</td>
<td>[]</td>
<td>(10.0)</td>
<td>Scanning</td>
<td></td>
</tr>
<tr>
<td>ScanType</td>
<td>SCANTYPE</td>
<td>Scan type, added SWEEP, HONEYCOMB in revGH, requested by pipeline</td>
<td>any</td>
<td>[string]</td>
<td>[str]</td>
<td></td>
<td>enum ['BOX', 'LISSAJOUS', 'SWEEP', 'HONEYCOMB']</td>
<td>['BOX']</td>
<td>Scanning</td>
<td></td>
</tr>
</tbody>
</table>
Keyword Descriptions revL Jan 2023

Observation Keywords

Datasource
FITS Name: DATASRC
FITS Type: str
Description: Overall source/type of data: ASTRO = Astronomical observation; CALIBRATION = calibration data; LAB = Laboratory data; TEST = Test data; FIRSTPOINT = SOFIA first pointing observation; OTHER = Any other source not listed here. If datasource is set to "CALIBRATION", the host file will be made public immediately upon ingestion.
Requirement: Absolutely Required for Archive Ingestion*

ObservationType
FITS Name: OBSTYPE
FITS Type: str
Description: The type of observation such as an astronomical exposure or a particular type of calibration exposure: OBJECT = astronomical object; STANDARD = Astronomical flux standard for calibration; LAMP = Calibration lamp; FLAT = Flat-field exposure for calibration; DARK = Dark current exposure for calibration, STANDARD_WAVECAL for FIFI-LS
Requirement: Required

SourceType
FITS Name: SRCTYPE
FITS Type: str
Description: Source type. Maps to AOR SourceType. Needed for reduction of slit spectra, but useful for other data types as well.
Requirement: Required

ObservationStatus
FITS Name: OBSSTAT
FITS Type: str
Description: Status of the observation: OK = observation performed successfully; ERROR = Observation completed but with an error.
Requirement: If entered by SI

KeywordDictionaryVersion
FITS Name: KWDICT
FITS Type: str
Description: SOFIA keyword dictionary version. Since the keyword dictionary is now a part of the DCS ICD (DCS_SI_01, this keyword should reference which version of the ICD is being used. The document rev (A, B, C, etc...) should be appended to the string 'DCS_SI_01' with an underscore (see example).
Requirement: Required

ObservationID
FITS Name: OBS_ID
FITS Type: str
Description: The unique identifier for any given data file, meant to provide ready timing and sequencing information at a glance to the user. It is created at the same time that the data file is first written, in a format common to all instruments (and thus mandated by the observatory). The OBS_ID is assigned to saved datasets only. Some test data may be taken during a flight for immediate diagnostic purposes, but not saved (e.g., a snapshot to verify pointing), in which case there would be no point in assigning an OBS_ID, but we note that the default should almost always be to save the data and thus assign this keyword. The OBS_ID number is distinct from the AOR_ID. The AOR_ID is the unique identifier for an AOR which can, in principle, generate multiple files to be saved. Each of these files would have a unique OBS_ID. The mapping from AOR_ID to OBS_ID is one-to-many, i.e., one AOR can produce multiple data files. Note that the converse is not true -- one data file cannot be the product of multiple AORs. We suggest the following as a format for the OBS_ID keyword: MMMMMMM_[C]nnn. Where: MMM = Mission ID (see MissionID) -- Data not taken as part of a SOFIA mission should set MMM to current date or some other suitable value; C = Channel identifier (optional) -- preferably a letter (B for Blue, S for short, etc...); nnn = Observation sequence number -- The sequence should be reset at mission start and advanced all the way through mission close-out (as defined by the MCCS), which should allow for capture of pre- and post-flight data -- This field will have a minimum of three digits (typical expected length), but more digits will be allowed as necessary.
Requirement: Absolutely Required for Archive Ingestion*

**ImageID**
- FITS Name: IMAGEID
- FITS Type: int
- Description: The image identification when there are multiple images for an observation within the SAME file (e.g. images stored as FITS extensions).
- Requirement: Multiple images in a single file for an observation, e.g. dithering, mapping, etc...

**ObjectName**
- FITS Name: OBJECT
- FITS Type: str
- Description: The object name as given by the observer, or as specified by the flight plan.
- Requirement: Required

**NAI_ID**
- FITS Name: NAIF_ID
- FITS Type: int
- Description: NAIF ID of a non sidereal object.
- Requirement: Non-sidereal target

**AOTUniqueID**
- FITS Name: AOT_ID
- FITS Type: str
- Description: Unique Astronomical Observation Template (AOT) identifier as defined in SI-DCS ICD. AORs generated from SOFIA USpot are based on the [SI]-DCS ICD which defines AOTs, the combination of the AOT name, ICD document number, and the ICD version number can uniquely identify an AOT version. Note that the ICD version number is important, AOTs in different versions of ICD can sometimes have conflicting values.
- Requirement: If AOT in use.

**AORUniqueID**
- FITS Name: AOR_ID
- FITS Type: str
- Description: Unique Astronomical Observation Request (AOR) identifier. The AOR_ID is assigned during the creation of the final version of an AOR to be used in flight planning. The value of this keyword should be equivalent to the AOR/ID tag in the AOR document. During Early Science, the AOR ID will be equivalent to the proposed observation ID and will be documented in the observing plan. The AOR_ID should not be reused once data is taken for this AOR to define a different observation. For example, if 90_0004_1 has been observed for SA 114-656, it should not be reused to observe SA 114-670 even if all other parameters are exactly the same.
- Requirement: If observation associated with DCS AOR

**FileGroupID**
- FITS Name: FILEGPID
- FITS Type: str
- Description: Identifier for a group of images stored as separate data files. This is the mechanism for associating multiple data files that should be considered together. Can be defined by the user -- not necessarily unique in the SOFIA mission. For example, suppose a map of Orion is made such that each individual map point is stored in a separate file. The user could then set this keyword to something like "OrionMap_20040101" for each of the files so that they can be associated later.
- Requirement: SI

**FileGroupB**
- FITS Name: FILEGP_B
- FITS Type: str
- Description: Identifier for a group of images stored as separate data files. This is the mechanism for associating multiple data files that should be considered together. Can be defined by the user -- not necessarily unique in the SOFIA mission. For example, suppose a map of Orion is made such that each individual map point is stored in a separate file. The user could then set this keyword to something like "OrionMap_20040101" for each of the files so that they can be associated later.
- Requirement: SI
FileGroupR
FITS Name: FILEGP_R
FITS Type: str
Description: Identifier for a group of images stored as separate data files. This is the mechanism for associating multiple data files that should be considered together. Can be defined by the user -- not necessarily unique in the SOFIA mission. For example, suppose a map of Orion is made such that each individual map point is stored in a separate file. The user could then set this keyword to something like "OrionMap_20040101" for each of the files so that they can be associated later.
Requirement: SI

Data Processing Related Keywords

ASSC_MSN
FITS Name: ASSC_MSN
FITS Type: str
Description: List of all mission IDs used in generating a combined output file.
Requirement: LEVEL 2/3/4 data, if product is associated with multiple missions

ASSC_FRQ
FITS Name: ASSC_FRQ
FITS Type: flt
Description: List of all frequencies used in generating a combined output file.
Requirement: LEVEL 2/3/4 data, if product is associated with multiple frequencies

ProcessingStatus
FITS Name: PROCSTAT
FITS Type: str
Description: Status of any processing applied to the data, as defined in the SOFIA Project Data Management Plan SOF-AR-PLA-PM03-2059: LEVEL_0 = Raw engineering data for diagnostic purposes, generally not intended for archiving; LEVEL_1 = Raw, uncalibrated science data in FITS or SDFITS format with complete header adhering to the SOFIA Keyword Dictionary; LEVEL_2 = Processed science data corrected for instrument artifacts; LEVEL_3 = Flux-calibrated science data (e.g. BUNIT keyword takes image to MJy/sr); LEVEL_4 = Higher order products.
Requirement: Required for all SI, FLITECAM already has

HeaderStatus
FITS Name: HEADSTAT
FITS Type: str
Description: Status of FITS header data (updated during post-processing). ORIGINAL: Header values are from original raw data file and have not been modified. UNKNOWN: header values have not been reviewed/verified. CORRECTED: header values have been corrected as part of post-processing, see HISTORY records for details. ERROR: There is a problem with the header values that has not been fixed, see COMMENT records for details. SI would set HEADSTAT = 'ORIGINAL' for raw data acquired on the aircraft.
MODIFIED: Headers have been changed but are not yet fully CORRECTED.
Requirement: Required

DataQuality
FITS Name: DATAQUAL
FITS Type: str
Description: Indicates overall data quality; indicator of scientific reliability for the dataset. Values are: NOMINAL: no outstanding issues with processing/calibration/observing conditions. USABLE: minor issue(s) with processing/calibration/conditions but should still be scientifically valid (perhaps with larger than usual uncertainties); see HISTORY records for details. PROBLEM: significant issue(s) encountered with processing, calibration, or observing conditions; may not be scientifically useful (depending on application); see HISTORY records for details. In general, these cases are addressed through manual re-processing before archiving and distribution. FAIL: data could not be processed successfully for some reason. These cases are rare and generally not archived or distributed to the GI.

NumberOfSpectral
FITS Name: N_SPEC
FITS Type: int
Description: Number of spectral, optional for spectroscopic modes.
Requirement: Required

AssociatedAORIDs
FITS Name: ASSC_AOR
FITS Type: str
Description: List of all unique input AOR IDs used in generating a combined output file.
Requirement: LEVEL 2/3/4 data, if product is associated with multiple DCS AORs

PipelineName
FITS Name: PIPELINE
FITS Type: str
Description: Name of pipeline/processing software used to generate file (e.g. “FDRP v1.0.0”). LEVEL 2/3/4 data only.

PipelineVersion
FITS Name: PIPEVERS
FITS Type: str
Description: Full release tag for pipeline that produced the file (e.g. “FDRP_1_0_0_UT2013_4_1”). LEVEL 2/3/4 data only.

ProductType
FITS Name: PRODTYPE
FITS Type: str
Description: Type of product produced by the processing software or pipeline, as defined in SI-DCS ICD. Should be simple identifier that the GI can use to look up in the processing handbook or ICD. ID should include an identifier for the software that was used to produce the file (e.g. "DRIP_XXX"). For example, the FORCAST product types are: DRIP-UNDISTORTED, DRIP-MERGED, DRIP-COADDED, DRIP-REDALL. Generally, the SI will not need to set this keyword for raw data.

DCSFileRevision
FITS Name: FILEREV
FITS Type: str
Description: File revision identifier, to be inserted by archive ingestion tasks if file was modified as part of post-processing. Change details to be documented using HISTORY records at the end of the header. String value, typically a lower case 'r' (ASCII 114) immediately followed by a integer greater than zero in decimal format with no padding or leading zeros. E.g., "r1" not "r01". The SI will not need to set this keyword for raw data.
Requirement: If file changed in post-processing.

Mission Management Keywords

ObservingPlanUniqueID
FITS Name: PLANID
FITS Type: str
Description: The observing plan which contains all the AORs. The value of this keyword should be equivalent to <AOR/Reference/ObservingPlan> in the AOR document.
Requirement: If observation associated with an observing plan.

AircraftDeployment
FITS Name: DEPLOY
FITS Type: str
Description: Aircraft base of operations for current instrument run.
Requirement: Required

MissionID
FITS Name: MISSN-ID

SOFIA FITS Keyword v0.1 January 2023
**FITS Type:** str
**Description:** Unique mission identifier, as specified in the Mission Plan and returned by the MCCS. Current spec for mission ID includes a date stamp, instrument ID, and mission type indicators.
**Requirement:** Absolutely Required for Archive Ingestion*

**FlightLeg**
**FITS Name:** FLIGHTLG
**FITS Type:** int
**Description:** Flight leg identifier for given mission ID.
**Requirement:** Required

**Origination Keywords**

**Origin**
**FITS Name:** ORIGIN
**FITS Type:** str
**Description:** Organization or institution responsible for creation of FITS file.
**Requirement:** Required

**Observers**
**FITS Name:** OBSERVER
**FITS Type:** str
**Description:** Observer name(s).
**Requirement:** Required

**FileCreator**
**FITS Name:** CREATOR
**FITS Type:** str
**Description:** Software task which wrote the FITS file (including version information).
**Requirement:** Required

**TelescopeOperator**
**FITS Name:** OPERATOR
**FITS Type:** str
**Description:** The telescope operator for the mission.
**Requirement:** Required

**Filename**
**FITS Name:** FILENAME
**FITS Type:** str
**Description:** Name of host file. The FILENAME keyword allows for different stages in the treatment of a dataset: raw, calibrated, custom reduced, pipelined, or reduced at an intermediate stage. Files resulting from actions taken upon a given raw dataset will all have the same OBS_ID, but could have different values of the FILENAME keyword. For the FILENAME format, we recommend using OBSID as a prefix, and attach qualifiers denoting the stage of treatment and format.
**Requirement:** Required

**Date and Time Keywords**

**CreationDate**
**FITS Name:** DATE
**FITS Type:** str
**Description:** UTC date of file creation in date/time format (yyyy-mm-ddThh:mm:ss.ssss); see FITS standard for additional detail.
**Requirement:** Required

**ObservationDate**
**FITS Name:** DATE-OBS
FITS Type: str
Description: UTC date of observation at the start of the exposure in date/time format (yyyy-mm-ddThh:mm:ss.ssss); see FITS standard for additional detail.
Requirement: Absolutely Required for Archive Ingestion*

ObservationStartUTC
FITS Name: UTCSTART
FITS Type: str
Description: UTC time at the start of the exposure.
Requirement: Required

ObservationEndUTC
FITS Name: UTCEND
FITS Type: str
Description: UTC time at the end of the exposure.
Requirement: Required

Environmental Keywords

WaterVaporZenith_Start
FITS Name: WVZ_STA
FITS Type: flt
Description: Integrated precipitable water vapor to the zenith, running average of previous 60 seconds. Start of observation.
Requirement: Required

WaterVaporZenith_End
FITS Name: WVZ_END
FITS Type: flt
Description: Integrated precipitable water vapor to the zenith, running average of previous 60 seconds. End of observation.
Requirement: Required

static_air_temp
FITS Name: TEMP_OUT
FITS Type: flt
Description: Static air temperature, as returned by the MCCS at start of observation.
Requirement: Required

PrimaryMirrorTemperature_1
FITS Name: TEMPPRI1
FITS Type: flt
Description: Primary mirror temp #1, at start of observation.
Requirement: Required

PrimaryMirrorTemperature_2
FITS Name: TEMPPRI2
FITS Type: flt
Description: Primary mirror temp #2, at start of observation.
Requirement: Required

PrimaryMirrorTemperature_3
FITS Name: TEMPPRI3
FITS Type: flt
Description: Primary mirror temp #3, at start of observation.
Requirement: Required

SecondaryMirrorTemperature_1
FITS Name: TEMPSEC1
FTTS Type: ft
Description: Temperature of secondary mirror, at start of observation.
Requirement: Required

Aircraft Keywords

Altitude_Start
FTTS Name: ALTI_STA
FTTS Type: ft
Description: Aircraft altitude from mean sea level according to MCCS (baro corrected), at start of observation.
Requirement: Required

Altitude_End
FTTS Name: ALTI_END
FTTS Type: ft
Description: Aircraft altitude from mean sea level according to MCCS (baro corrected), at end of observation.
Requirement: Required

Airspeed
FTTS Name: AIRSPEED
FTTS Type: ft
Description: True aircraft airspeed, as returned by the MCCS at start of observation.
Requirement: Required

GroundSpeed
FTTS Name: GRDSPEED
FTTS Type: ft
Description: Current ground speed of aircraft, as returned by the MCCS at start of observation.
Requirement: Required

Latitude_Start
FTTS Name: LAT_STA
FTTS Type: ft
Description: Current aircraft latitude, as returned by the MCCS at start of observation.
Requirement: Required

Longitude_Start
FTTS Name: LON_STA
FTTS Type: ft
Description: Current aircraft longitude, as returned by the MCCS at start of observation. W is negative, E is positive, from prime meridian.
Requirement: Required

Latitude_End
FTTS Name: LAT_END
FTTS Type: ft
Description: Current aircraft latitude, as returned by the MCCS at end of observation.
Requirement: Required

Longitude_End
FTTS Name: LON_END
FTTS Type: ft
Description: Current aircraft longitude, as returned by the MCCS at end of observation. W is negative, E is positive, from prime meridian.
Requirement: Required

Heading
FITS Name: HEADING
FITS Type: flt
Description: True aircraft heading, as returned by the MCCS at start of observation.
Requirement: Required

TrackAngle
FITS Name: TRACKANG
FITS Type: flt
Description: Aircraft track angle, as returned by the MCCS at start of observation.
Requirement: Required

Telescope Keywords

Telescope
FITS Name: TELESCOP
FITS Type: str
Description: Telescope used for the observation. Usually SOFIA but can also be telescope an another observatory.
Requirement: Required

TelescopeConfig
FITS Name: TELCONF
FITS Type: str
Description: Telescope configuration. The configuration defines the mirrors, correctors, light paths, etc... On SOFIA, this should be controlled by the MCCS.
Requirement: Required

TelescopeRA
FITS Name: TELRA
FITS Type: flt
Description: Right ascension of SI boresight (SIBS), as returned by the telescope control system (J2000). Representation may be either decimal hours or HH:MM:SS.s.
Requirement: Required

TelescopeDec
FITS Name: TELDEC
FITS Type: flt
Description: Declination of SI boresight, as returned by the telescope control system (J2000). Representation may be either decimal degrees or DD:MM:SS.
Requirement: Required

TelescopeVPA
FITS Name: TELVPA
FITS Type: flt
Description: Vertical Position Angle (VPA) of SI boresight, as returned by the telescope control system in ICRS (J2000) -- (given in the flight plans) is the Zenith PA (from North through East). For EXES it means that slit PA=ROF+270.
Requirement: Required

TelescopeEquinox
FITS Name: TELEQUI
FITS Type: str
Description: Equinox of returned RA/Dec/VPA.
Requirement: Required

LastRewindUTC
FITS Name: LASTREW
FITS Type: str
Description: UTC time of last telescope rewind.
Requirement: Required

TelescopeFocus_Start
FTS Name: FOCUS_ST
FTS Type: flt
Description: Telescope focus: Measured position of the FCM focus mechanism in the T direction -- as returned by the TA (microns) at observation start.
Requirement: Required

TelescopeFocus_End
FTS Name: FOCUS_EN
FTS Type: flt
Description: Telescope focus: Measured position of the FCM focus mechanism in the T direction -- as returned by the TA (microns) at observation end.
Requirement: Required

TelescopeElevation
FTS Name: TELEL
FTS Type: flt
Description: Telescope elevation above the horizon. At start of observation.
Requirement: Required

TelescopeCrossElevation
FTS Name: TELXEL
FTS Type: flt
Description: Telescope cross elevation in the cavity reference frame. At start of observation.
Requirement: Required

TelescopeLineOfSight
FTS Name: TELLOS
FTS Type: flt
Description: Telescope line of sight angle in the cavity reference frame. At start of observation.
Requirement: Required

TascuStatus
FTS Name: TSC-STAT
FTS Type: str
Description: State of the TASCU system at the end of the current observation as returned by the MCCS. See specification in MCCS_SI_04.
Requirement: Required

TascuFBCStatus
FTS Name: FBC-STAT
FTS Type: str
Description: State of the flexible body compensation system at the end of the current observation as returned by the TA. See specification in TA-MCCS-F.
Requirement: Required

ObservationRequestRA
FTS Name: OBSRA
FTS Type: flt
Description: Requested right ascension for the observation before any manual "tweaking", either from the instrument control software, an AOR, or the flight executor. This may be different from the actual object coordinates and/or telescope coordinates. Representation may be either decimal hours or HH:MM:SS.s. Reference frame can be specified in the comment field (ICRS recommended) and equinox specified using the Equinox keyword.
Requirement: Required

ObservationRequestDec
FITS Name: OBSDEC
FITS Type: flt
Description: Requested declination for the observation before any manual "tweaking", either from the instrument control software, an AOR, or the flight executor. This may be different from the actual object coordinates and/or telescope coordinates. Representation may be either decimal degrees or DD:MM:SS. Reference frame can be specified in comment field (ICRS recommended) and equinox specified using the Equinox keyword.
Requirement: Required

ObservationRequestEquinox
FITS Name: EQUINOX
FITS Type: flt
Description: Equinox for ObservationRA and ObservationDec. Does not apply to TelescopeRA/Dec which are fixed to ICRS (J2000).
See FITS standard for additional detail. If not specified, equinox is assumed to be year 2000.
Requirement: Required

ZenithAngle_Start
FITS Name: ZA_START
FITS Type: flt
Description: Zenith angle of telescope pointing at start of acquisition. Use telescope elevation to calculate ZA.
Requirement: Required

ZenithAngle_End
FITS Name: ZA_END
FITS Type: flt
Description: Zenith angle of telescope pointing at end of acquisition. Use telescope elevation to calculate ZA.
Requirement: Required

TrackingMode
FITS Name: TRACMODE
FITS Type: str
Description: SOFIA Tracking mode (last commanded). See MCCS_SI_04 for description of states and modes.
Requirement: Tracking

TrackingError
FITS Name: TRACERR
FITS Type: log
Description: Flag to indicate if there was a tracking error during the observation. Ideally the SI software would monitor the tracking mode (ta_trc.trc_status_table.main_op_mode_id) for any error/abnormalities. If an error does occur, the TRACERR would then be set to T.
Requirement: Tracking

Data Collection Keywords

isChopping
FITS Name: CHOPPING
FITS Type: log
Description: Chopping flag
Requirement: If mode in use.

isNodding
FITS Name: NODDING
FITS Type: log
Description: Nodding flag -- this should be set if the SI is executing a repeated nod pattern, for example (ABBA)(ABBA), etc...
Requirement: If mode in use.

isDithering
FITS Name: DITHER
FITS Type: log
Description: Dithering flag
Requirement: If mode in use.

isMapping
FITS Name: MAPPING
FITS Type: log
Description: Mapping flag.
Requirement: If mode in use.

isScanning
FITS Name: SCANNING
FITS Type: log
Description: Scanning flag.
Requirement: If mode in use.

Annotation Keywords

Comment
FITS Name: COMMENT
FITS Type: str
Description: Comment keyword. This keyword does not normally have an equal sign. Any number of COMMENT records may be present from any legitimate source. This is a good place for <AOR/SpecialInstructions>.
Requirement: If entered by SI or pipeline

History
FITS Name: HISTORY
FITS Type: str
Description: History keyword. This keyword does not normally have an equal sign. This keyword should be reserved for any processing of the data, especially pre-processing (i.e. instrument level). Any number of HISTORY records may be present.
Requirement: If entered by SI or pipeline

Error
FITS Name: ERROR
FITS Type: str
Description: Error information *useful to a guest investigator*; this is not meant to be a catalog of system errors. Any number of Error messages may be present. In the FITS implementation, sequence numbers are used to order the information. Generally this keyword should only be used if OBSSTAT=ERROR.
Requirement: If entered by SI

Instrument Keywords

Instrument
FITS Name: INSTRUME
FITS Type: str
Description: Instrument name, as specified in the SI-DCS ICD.
Requirement: Absolutely Required for Archive Ingestion*

Datatype
FITS Name: DATATYPE
FITS Type: str
Description: Type of observation data: Image, Spectral, or Other.
Requirement: Required

InstrumentConfiguration
FITS Name: INSTCFG
**FITS Type:** str  
**Description:** Instrument configuration - simple description, as specified in the SI-DCS ICD. e.g. IMAGING, GRISM, SPECTROSCOPY, etc...  
**Requirement:** Required

### Instrument Mode
**FITS Name:** INSTMODE  
**FITS Type:** str  
**Description:** Instrument observing mode - simple description, as specified in the SI-DCS ICD. e.g. C2N, MAPPING, TOTAL_POWER, etc...  
**Requirement:** Required

### MCCS Mode
**FITS Name:** MCCSMODE  
**FITS Type:** str  
**Description:** SI mode as defined in the MCCS_SI_04.  
**Requirement:** Required

### Exposure Time
**FITS Name:** EXPTIME  
**FITS Type:** flt  
**Description:** Total effective on-source exposure time of the observation. This is the total time during which photons from the object of interest are collected by the detector. It includes any shutter corrections (which may not apply for most (all?) SOFIA instruments), and nodding/chopping corrections, and should match the algorithm(s) supplied for any time estimation tools (e.g. SITE). For FITS, EXPTIME should be used instead of the FITS specification EXPOSURE. ExposureTime should be specified for all images in a data file.  
**Requirement:** Required

### Spectral Element 1
**FITS Name:** SPECTEL1  
**FITS Type:** str  
**Description:** First spectral element (filter, grism, etc...) as specified in SI-DCS ICD. Need only contain the unique identifier from the SI-DCS ICD; more detailed filter/grism/mixer can be stored in instrument-specific keywords.  
**Requirement:** Absolutely Required for Archive Ingestion*

### Spectral Element 2
**FITS Name:** SPECTEL2  
**FITS Type:** str  
**Description:** Second spectral element (filter, grism, etc...) as specified in SI-DCS ICD. Need only contain the unique identifier from the SI-DCS ICD; more detailed filter/grism/mixer can be stored in instrument-specific keywords. Set to "NONE" if no second element in use.  
**Requirement:** Absolutely Required for Archive Ingestion*

### Instrument Slit
**FITS Name:** SLIT  
**FITS Type:** str  
**Description:** Slit identifier, as specified in the SI-DCS ICD. Need only contain the unique identifier; more detailed info can be stored in instrument-specific keywords.  
**Requirement:** Spectroscopy configs: if slit in use.

### Wavelength Central
**FITS Name:** WAVECENT  
**FITS Type:** flt  
**Description:** Central wavelength of observation for imaging modes. This is a rough figure only, intended to be used for archive searches across all SOFIA instruments.  
**Requirement:** Imaging modes only.
FITS Name: RESOLUN
FITS Type: flt
Description: Approximate spectral resolution of observation for spectroscopy modes, expressed as \( R = c / \Delta V = \lambda / \Delta \lambda \). This is a rough figure only, intended to be used for archive searches across all SOFIA instruments.
Requirement: Spectroscopy modes only.

DetectorChannel
FITS Name: DETCHAN
FITS Type: str
Description: Detector Channel as specified in the SI-DCS ICD.
Requirement: FORCAST and FIFI-LS should populate these.

TotalIntegrationTime
FITS Name: TOTINT
FITS Type: flt
Description: Total integration time (s)
Requirement: FORCAST

Array Detector Keywords

Detector
FITS Name: DETECTOR
FITS Type: str
Description: Detector name.
Requirement: Array instruments only.

DetectorSize
FITS Name: DETSIZE
FITS Type: str
Description: Unbinned detector size in pixels.
Requirement: Array instruments only.

PixelScale
FITS Name: PIXSCAL
FITS Type: flt
Description: Projected pixel scale on the sky.
Requirement: Array instruments only.

Subarrays
FITS Name: SUBARRNO
FITS Type: int
Description: Number of sub arrays used in data acquisition. Full array assumed if absent.
Requirement: If subarrays in use.

SubarraySize
FITS Name: SUBARR%2d
FITS Type: str
Description: The log unbinned size of the n-th subarray in section notation.
Requirement: If subarrays in use.

ScienceInstrumentBoresightX
FITS Name: SIBS_X
FITS Type: flt
Description: Location of SI boresight in pixel space -- \( x_{si} \).
Requirement: Array instruments only.

ScienceInstrumentBoresightY
FITS Name: SIBS_Y
FITS Type: flt
Description: Location of SI boresight in pixel space -- y_si.
Requirement: Array instruments only.

WCS_CTYPE
FITS Name: CTYPEn
FITS Type: str
Description: WCS: Coordinate type and projection for n-th axis. See list of supported projections at http://tdc-www.harvard.edu/wcstools/wcstools.fits.html.
Requirement: Imaging only.

WCS_CRPIX
FITS Name: CRPIXn
FITS Type: flt
Description: WCS: pixel coordinates of the reference point of the n-th axis to which the projection and the rotation refer.
Requirement: Array instruments only.

WCS_CRVAL
FITS Name: CRVALn
FITS Type: flt
Description: WCS: reference pixel coordinate for n-th axis as right ascension and declination or longitude and latitude in decimal degrees. FITS Comment field should include estimate of uncertainty in absolute pointing (See TBD Document).
Requirement: Imaging only.

WCS_CDELT
FITS Name: CDELTn
FITS Type: flt
Description: WCS: Plate scale in degrees per pixel for the n-th axis at the reference pixel. Either the CDi_j *or* the CDELT/CROTA keywords should be used, but not both. FITS comment field should include estimate of uncertainty based on known distortion or other optical effects.
Requirement: Imaging only.

WCS_CROTA2
FITS Name: CROTA2
FITS Type: flt
Description: WCS: Rotation of axes in degrees. WCS FITS convention is to use CROTA2. Either the CDi_j *or* the CDELT/CROTA keywords should be used, but not both. FITS comment field should include estimate of uncertainty in TA rotation of field (see TBD Document).
Requirement: Imaging only.

WCS_RotMatrix
FITS Name: CDi_j
FITS Type: flt
Description: WCS: Rotation matrix for WCS -- CD1_1, CD1_2, CD2_1, and CD2_2. Either the CDi_j *or* the CDELT/CROTA keywords should be used, but not both. FITS comment field should include estimate of uncertainty for each matrix element.
Requirement: Imaging only.

Heterodyne Keywords

FrontendDevice
FITS Name: FRONTEND
FITS Type: str
Description: Name of frontend device.
Requirement: Heterodyne instruments only.

BackendDevice
FITS Name: BACKEND
FITS Type: str
Description: Name of backend device.
Requirement: Heterodyne instruments only.

BackendBandwidth
FITS Name: BANDWID
FITS Type: flt
Description: Total bandwidth of heterodyne backend (Hz).
Requirement: Heterodyne instruments only.

SystemTemperature
FITS Name: TSYS
FITS Type: flt
Description: Heterodyne system temperature.
Requirement: Heterodyne instruments only.

FrequencyResolution
FITS Name: FREQRES
FITS Type: flt
Description: Nominal frequency resolution -- may differ from channel spacing.
Requirement: Heterodyne instruments only.

ReferenceFrequency
FITS Name: OBSFREQ
FITS Type: flt
Description: The observed frequency (Hz) at the reference pixel of the frequency-like axis.
Requirement: Heterodyne instruments only.

SidebandFrequency
FITS Name: IMAGFREQ
FITS Type: flt
Description: The image sideband freq (Hz) corresponding to ReferenceFrequency.
Requirement: Heterodyne instruments only.

RestFrequency
FITS Name: RESTFREQ
FITS Type: flt
Description: Rest frequency.
Requirement: Heterodyne instruments only.

VelocityDefinition
FITS Name: VELDEF
FITS Type: str
Description: The velocity definition and frame (8 characters). The first 4 characters describe the velocity definition. Possible definitions include: RADI (radio); OPTI (optical); RELA (relativistic). The second 4 characters describe the reference frame (e.g. -LSR, -HEL, -OBS). If the frequency-like axis gives a frame, then the frame in VELDEF only applies to any velocities given as columns or keywords (virtual columns).
Requirement: Heterodyne instruments only.

VelocityFrame
FITS Name: VFRAME
FITS Type: flt
Description: The radial velocity of the reference frame wrt the observer. V_frame - V_telescope.
Requirement: Heterodyne instruments only.

RadialVelocity
FITS Name: RVSYS
FTS Type: fl
Description: The radial velocity, V_source - V_telescope.
Requirement: Heterodyne instruments only.

Data Structure Keywords

Chopping Keywords

**ChopFrequency**
FTS Name: CHPFREQ
FTS Type: fl
Description: Measured TCM chop frequency
Requirement: Chopping

**ChopProfile**
FTS Name: CHPROF
FTS Type: str
Description: Indicates whether 2 or 3 point chopping profile is being used. For 3-point chopping, the center position usually contains the object of interest. MCCS returns '2-POINT' for 2 point and '3-POINT' for 3-point.
Requirement: Chopping

**ChopSymmetry**
FTS Name: CHPSYM
FTS Type: str
Description: Indicates whether symmetric or asymmetric chopping is being used.
Requirement: Chopping

**ChopAmplitude_1**
FTS Name: CHPAMP1
FTS Type: fl
Description: Calculated amplitude on the sky. MCCS calculates the amplitude on the sky based on actual SMA data.
Requirement: Chopping

**ChopAmplitude_2**
FTS Name: CHPAMP2
FTS Type: fl
Description: Calculated second amplitude on the sky. MCCS calculates the amplitude on the sky based on actual SMA data.
Requirement: Chopping

**ChopCoordSys**
FTS Name: CHPCRSYS
FTS Type: str
Description: Reference frame for which MCCS computes SMA parameters. MCCS calculates sky_tip, sky_tilt, and sky_angle differently depending on which reference frame was last used in the sma.chop command. This value defaults to TARF if sma.chop has not been sent previously.
Requirement: Chopping

**ChopAngle**
FTS Name: CHPANGLE
FTS Type: fl
Description: Calculated angle in the sky_coord_sys reference frame. MCCS calculates the angle in the sky_coord_sys reference frame based on actual SMA data. The angle is the orientation of the chop throw with up equals zero.
Requirement: Chopping

**ChopTip**
FTS Name: CHPTIP
FTS Type: fl
Description: Calculated tip in the sky_coord_sys reference frame. MCCS calculates the tip in the sky_coord_sys reference frame based on actual SMA data.
Requirement: Chopping

ChopTilt
FTS Name: CHPTILT
FTS Type: flt
Description: Calculated tilt in the sky_coord_sys reference frame. MCCS calculates the tilt in the sky_coord_sys reference frame based on actual SMA data.
Requirement: Chopping

ChopPhase
FTS Name: CHPPHASE
FTS Type: flt
Description: Chopper phase as defined by MCCS. Time delay between the sync signal and the start of the setpoint which has the positive tilt increment with respect to the commanded offset.
Requirement: Chopping

Nodding Keywords

NodDwellTime
FTS Name: NODTIME
FTS Type: flt
Description: Total time per nod position (dwell time) -- not including nod slew time and nod settle time (see NodSettleTime).
Requirement: Nodding

NodCycles
FTS Name: NODN
FTS Type: int
Description: Number of nod cycles.
Requirement: Nodding

NodSettleTime
FTS Name: NODSETL
FTS Type: flt
Description: Time required for telescope to settle after nod slew is complete. Amount of time to wait between when telescope arrives at nod destination and when to begin integrating.
Requirement: Nodding

NodAmplitude
FTS Name: NODAMP
FTS Type: flt
Description: Nod amplitude on sky.
Requirement: Nodding

NodBeam
FTS Name: NODBEAM
FTS Type: str
Description: Current nod beam position.
Requirement: Nodding

NodPattern
FTS Name: NODPATT
FTS Type: str
Description: Pointing sequence pattern for one nod cycle (there could be many nod cycles in an observation). Beam A is usually assumed to contain the object of interest.
Requirement: Nodding
**NodStyle**

**FITS Name:** NODSTYLE  
**FITS Type:** str  
**Description:** Nodding style for coordinated chopping/nodding. e.g. nod-matched-chop, nod-perpendicular-chop, etc...  
**Requirement:** Nodding/Chopping

**NodCoordSys**

**FITS Name:** NODCRSYS  
**FITS Type:** str  
**Description:** Coordinate system in which nod positions (NODPOSX,Y) and rotations are defined.  
**Requirement:** Nodding

**NodAngle**

**FITS Name:** NODANGLE  
**FITS Type:** fl  
**Description:** Nod angle, clockwise from y axis defined by NODCRSYS.  
**Requirement:** Nodding

**Dithering Keywords**

**DitherCoordiantes**

**FITS Name:** DTHCRSYS  
**FITS Type:** str  
**Description:** Coordinate system for dither offsets.  
**Requirement:** Dithering

**DitherXOffset**

**FITS Name:** DTHXOFF  
**FITS Type:** fl  
**Description:** Specified dither offset X for each subsequent frame, in arcseconds.  
**Requirement:** Dithering

**DitherYOffset**

**FITS Name:** DTHYOFF  
**FITS Type:** fl  
**Description:** Specified dither offset Y for each subsequent frame, in arcseconds.  
**Requirement:** Dithering

**DitherPattern**

**FITS Name:** DTHPATT  
**FITS Type:** str  
**Description:** Approximate shape of dither pattern.  
**Requirement:** Dithering

**DitherPositions**

**FITS Name:** DTHNPOS  
**FITS Type:** int  
**Description:** Number of dither positions.  
**Requirement:** Dithering

**DitherPositionIndex**

**FITS Name:** DTHINDEX  
**FITS Type:** int  
**Description:** Dither position index.  
**Requirement:** Dithering

**Mapping Keywords**
**MapCoordSys**

**FITS Name:** MAPCRSYS

**FITS Type:** str

**Description:** Coordinate system in which extended source map positions are defined. OBSRA/DEC are assumed to describe position of Map Center.

**Requirement:** Mapping

**MapPositionsX**

**FITS Name:** MAPNXPOS

**FITS Type:** int

**Description:** Number of map positions in X coordinate as defined by MAPCRSYS.

**Requirement:** Mapping

**MapPositionsY**

**FITS Name:** MAPNYPOS

**FITS Type:** int

**Description:** Number of map positions in Y coordinate as defined by MAPCRSYS.

**Requirement:** Mapping

**MapIntervalX**

**FITS Name:** MAPINTX

**FITS Type:** flt

**Description:** Mapping step interval in X coordinate as defined by MAPCRSYS. OBSRA/DEC are assumed to describe position of Map Center.

**Requirement:** Mapping

**MapIntervalY**

**FITS Name:** MAPINTY

**FITS Type:** flt

**Description:** Mapping step interval in Y coordinate as defined by MAPCRSYS. OBSRA/DEC are assumed to describe position of Map Center.

**Requirement:** Mapping

**Scanning Keywords (Constant Velocity)**

**ScanRate**

**FITS Name:** SCNRATE

**FITS Type:** flt

**Description:** Commanded slew rate in arcsec/sec along path.

**Requirement:** Scanning

**ScanType**

**FITS Name:** SCANTYPE

**FITS Type:** str

**Description:** Scan type HAWC (BOX | LISSAJOUS | SWEEP | HONEYCOMB )

**Requirement:** Scanning
<table>
<thead>
<tr>
<th>ACRONYMS</th>
<th>Description</th>
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<tbody>
<tr>
<td>AOR</td>
<td>Astronomical Observation Request</td>
</tr>
<tr>
<td>API</td>
<td>Application Programming Interface</td>
</tr>
<tr>
<td>ARC</td>
<td>Ames Research Center</td>
</tr>
<tr>
<td>CCB</td>
<td>Configuration Control Board</td>
</tr>
<tr>
<td>CM</td>
<td>Configuration Management</td>
</tr>
<tr>
<td>CORBA</td>
<td>Common Object Request Broker Architecture</td>
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<tr>
<td>CS</td>
<td>Cycle Scheduler</td>
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<tr>
<td>CSCI</td>
<td>Computer Software Configuration Item</td>
</tr>
<tr>
<td>CVS</td>
<td>Concurrent Versioning System</td>
</tr>
<tr>
<td>DCS</td>
<td>Data Cycle System</td>
</tr>
<tr>
<td>FMI</td>
<td>Flight Management Infrastructure</td>
</tr>
<tr>
<td>FPE</td>
<td>Flight Plan Editor</td>
</tr>
<tr>
<td>GI</td>
<td>Guest Investigator (early nomenclature for someone who submits a proposal)</td>
</tr>
<tr>
<td>GO</td>
<td>Guest Observer (replaced GI)</td>
</tr>
<tr>
<td>GUI</td>
<td>Graphical User Interface</td>
</tr>
<tr>
<td>HEL</td>
<td>Heliocentric</td>
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<tr>
<td>HTTPS</td>
<td>Hypertext Transfer Protocol Secure</td>
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<tr>
<td>JSP</td>
<td>Java Server Page</td>
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<tr>
<td>LSR</td>
<td>Local Standard of Rest</td>
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<tr>
<td>MCCS</td>
<td>Mission Control and Communication System</td>
</tr>
<tr>
<td>NAIF_ID</td>
<td>Navigation and Ancillary Information Facility (NAIF) assigned ID for an object</td>
</tr>
<tr>
<td>ObsPlan</td>
<td>Observing Plan</td>
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<tr>
<td>ObsBlock</td>
<td>Observation Block</td>
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<tr>
<td>SI</td>
<td>Science Instrument</td>
</tr>
<tr>
<td>SITE</td>
<td>Science Instrument Time Estimator</td>
</tr>
<tr>
<td>SMA</td>
<td>Secondary Mission Assembly</td>
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<tr>
<td>SMO</td>
<td>SOFIA Missions Operations</td>
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<tr>
<td>SSC</td>
<td>SOFIA Science Center</td>
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<td>SOFIA Science Missions Operations</td>
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<tr>
<td>SSMOC</td>
<td>SOFIA Science Missions Operations Center</td>
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<tr>
<td>STS</td>
<td>Short Term Scheduler</td>
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<td>Telescope Assembly</td>
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<td>Time Allocation Committee</td>
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<td>University Space Research Association</td>
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<tr>
<td>XML</td>
<td>Extensible Markup Language</td>
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</table>