

IMAGER Bugs & Release Notes

A GILDAS software

April, 5, 2024

Version 4.0-02

corresponding to code language versions:

Language	DISPLAY	1.9-09	05-Apr-2024	S.Guilloteau
Language	CLEAN	6.8-02	10-Mar-2024	S.Guilloteau
Language	CALIBRATE	1.9-04	09-Nov-2023	S.Guilloteau
Language	ADVANCED	2.7-09	13-Nov-2023	S.Guilloteau
Language	BUNDLES	1.6-07	31-Aug-2023	S.Guilloteau
Language	IMAGER	1.2-92	13-Jul-2023	S.Guilloteau
Language	SIMULATE	1.0-04	14-Sep-2023	S.Guilloteau

Questions? Comments? Bug reports? Mail to: imager-hotline@services.cnrs.fr

The GILDAS team and **IMAGER** developpers welcome an acknowledgment in publications using GILDAS software and **IMAGER** to reduce and/or analyze data.

Please use the following reference in your publications:

<http://www.iram.fr/IRAMFR/GILDAS>

and also when using **IMAGER**

<https://imager.oas.u-bordeaux.fr>

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Note on Documentation

This document contains the list of Changes and Bug tracking records for the **IMAGER** program. The **IMAGER** program documentation can be found here for the PDF version or there for the Web version

Notations

Throughout this document, colors are used to highlight the names of categories of entities:

- **PROGRAM** is a GILDAS program name.
- **LANGUAGE** is a SIC Language name
- **NAME** is a command name, keyword or option
- **SICVAR** is a SIC variable
- **ScriptName** is an **IMAGER** script (external text file) that can be executed by the **@** command
- **FileName** is an external file, e.g. a data file.

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1 Bugs and Release Notes

This section lists known bugs (or strange features) that are known at the date of release of the documentation, and the list of changes since previous releases.

Notes since Documentation release of Version 3.8, dated Jun, 23rd, 2023.
 – Last release 05-Mar-2024 (**IMAGER** version 4.1-00 / mar24) –

1.1 Known Bugs

This section contains the list of bugs known as of April 10, 2024.

Pending bugs

- **VIEW CCT** on data cubes may cause occasional crashes. The origin of the bug is most likely related to the pencil colour handling in the graphic library, but yet unidentified. It seems to have almost disappeared in more recent versions...
- You may need to remove your `$HOME/.casa/casa2gildas.py*` file to ensure that **IMAGER** gets the latest version of that file. Do this in case the `casagildas()` tool produces strange results, and relaunch **IMAGER** once then CASA again before using the tool.
- confirmed 04-Jan-2023 **CLEAN** may stop with 0 iterations if it already did so because of improper input parameters, even after resetting the parameters. Probably a missing initialization of some Logical variable. Unfortunately, the only work-around so far is to restart **IMAGER**.
- You may need to remove your `$HOME/.gag/*.html` files to access to the latest HTML documentation in a consistent way. Links may be broken otherwise.

1.2 Recent changes in repository

This section gives the changes and bug corrections made since the last documentation release (as dated above). The changes are available in the working repository, but may not be distributed in any standard Imager release yet.

Released in Version 4.0 and beyond

- corrected 04-Apr-2024 **PIPELINE COLLECT** and the subsequent **PIPELINE APPLY** could fail if some spectral windows had different flags than others, leading to different time stamps or antenna numbers. Solved by using a fallback solution in which the closest (in frequency) self-calibration solution is used instead of the (non available) delay self-calibration. This loses some precision, though.
- **Corrected** 10-Mar-2024 `fits-to-uvt.ima` was no longer working with option `/WEIGHT` due to obsolete task `uv_casa` (probably since early 2019 !...). Also **UV_REWEIGHT /FILE** was not working correctly.
- **Corrected** 08-Mar-2024 **UV_PREVIEW** was occasionally incorrectly identifying line emission, leaving no line-free channel. This lead the **PIPELINE** to crash, as no Continuum image could be created. Algorithm has been improved.

- 07-Mar-2024 CASA keeps producing incomplete UVFITS files. Allow the **READ** command to recover what is possible in such cases. Although visibilities are in general complete (except perhaps the last one), these incomplete files will most likely miss the absolute coordinates information that must be supplied manually by **UV_FIELDS**.
- **Corrected** 05-Mar-2024, **Discovered** 6-Feb-2024 **PIPELINE /MODE SURVEY** was not working properly when strong lines were present in spectral window.
- 05-Mar-2024 Implement **STATISTIC /FILE** option
- **Corrected** 22-Feb-2024 **KEPLER MASK** was using wrong velocity sign
- **Corrected** 22-Feb-2024 **MASK** 3-D masks were incorrectly aligned in Frequency: it ought to be in Velocity.
- 17-Feb-2024 Implement **WRITE CCT /APPEND**
- 14-Feb-2024 Protect **CATALOG** from empty (or out of range) catalogs.
- 11-Feb-2024 Allow use of **SHOW NOISE Buffer**
- 06-Feb-2024 Improve polarization scripts to handle multiple spectral windows at once
- **Corrected** 15-Jan-2024 **UV_FILTER /FILE** was crashing, due to incorrect handling of the Flags. **UV_FILTER/ZERO** now transmit these flags correctly.

In Version 3.9

- **Corrected** 09-Jan-2024 Flagged data were not properly masked in Robust weighting scheme: they could affect the Robust parameter derivation. Also **UV_STAT WEIGHT** could fail if the weight channel ended up flagged.
- 04-Dec-2023, minor updates 11-Jan-2024 Display scripts now working on non-standard cubes
- **Corrected** 13-Nov-2023 **SELFCAL** could become extremely slow and produce ‘*wrong*’ results (not very wrong, though, mostly noisier and sub-optimal) on ALMA data that have variable integration times (due to flagging, etc...). Solved by implementing a better time consistency check, with a 0.5 seconds margin.
- **Corrected** 13-Nov-2023 **UV_FIT** failed in case of too many functions (more than 2) causing some strange results.
- **Corrected** 13-Nov-2023 **MAP_COMBINE INDEX** was bugged.
- 20-Oct-2023 **MASK /FROM** implementation.
- 20-Oct-2023 **MASK LABEL** implementation.
- **Corrected** 19-Oct-2023 **CLEAN /RESTART** failed with some methods, due to a unallocated array in call sequence.
- **Corrected** 14-Oct-2023 **CCT_CONVERT** used wrong flux scale (must be per pixel, not per beam area).

- **Corrected** 14-Oct-2023 **CLEAN** CLARK and SDI failed if more than 1 beam in frequency.
- **Corrected** 05-Oct-2023, **Discovered** 03-Oct-2023 **COMBINE** was crashing on Linux and/or giving wrong results when Spectral and Spatial resampling were needed.
- **Corrected** 04-Oct-2023, **Discovered** same day **UV_MERGE /MODE CONT** was occasionally leading to corrupted UV tables when starting from Spectral line data.
- **Corrected** 03-Oct-2023, **Discovered** same day **UV_MERGE /MODE CONT** was applying an incorrect scale factor to the baseline lengths.
- **Corrected** 29-Sep-2023, **Discovered** 27-Sep-2023 **READ** could lead to delayed crashes when reading Mosaics with different number of fields. The `map%centers` array was not properly re-allocated.
- **Corrected** 28-Sep-2023, **Discovered** same day **UV_MERGE /MODE CONT** was not evaluating the number of output visibilities when starting from line tables. This could lead to crashes.
- 26-Sep-2023 Kernel patch: make **DEFINE FITS ... HEADER** tolerant against incomplete FITS Xtension. Combined with a similar tolerance in **READ UV**, this allows to read incomplete UVFITS files occasionally produced by CASA.
- **Corrected** 26-Sep-2023, **Discovered** 20-Apr-2023 Finally fixed a bug in **UV_MERGE /MODE CONCAT** that was leading to crash on Linux, but had no consequence on MacOS.
- 26-Sep-2023 Fixed a bug in CSV Astro catalog handling. Line names could have a leading space, resulting in empty line identification in the **PIPELINE** produced file names.
- 20-Sep-2023 Fixed location of log and temporary files on Apptainer version. First MacPort working version.
- 18-Sep-2023 **CATALOG** did not scan unit properly in some cases. **STATISTIC** output improved. (Moved to Version 3.9-05)
- 14-Sep-2023 Simulator was not adding Noise properly. Syntax error in script, and wrong calls (Moved to Version 3.9-04)
- 06-Sep-2023 **COMBINE** and **MAP_COMBINE** had a memory leak (Pointers are not freed in Fortran, contrary to Allocatables).
- 06-Sep-2023 **UV_RESTORE** was requiring too much memory. Implement a similar scheme for **UV_RESIDUAL**.
- 04-Sep-2023 Channel ranges if width smaller than **BEAM_GAP** are ignored in common beam ranges determination.
- 29-Jul-2023 Shaded areas were slightly off in **UV_PREVIEW**.
- 29-Jul-2023 Improve **UV_SHORT /RESAMPLE**: handle arbitrary blanking and always align in Frequency before resampling.
- 29-Jul-2023 Small syntax modification of **SPECIFY**. Added **SPECIFY SPECUNIT** to change unit of spectral axis and **SPECIFY BLANKING** to change blanking value.

- 13-Aug-2023 **READ Item FileFilter** will open a file search widget.
- 24-Jul-2023 Ensure **SELF CAL** works for Mosaics as simply as for Single fields.

In Version 3.8

- 13-Jul-2023 **PIPELINE EXPLORE** action and related bug corrections or improvements in **UV_STAT**
- 12-Jul-2023 A number of small bug corrections: **SPECIFY /FOR FIND /SPECIES** were not working, and **XY_SHORT** was not setting the axes correctly.
- 07-Jul-2023 A number of bug corrections for Mosaics, introduced by the implementation of the **ADD_NOISE** command, others related of **UV_SHORT**, or even from the Kernel (sources at declinations between 0 and -1 degree)
- 21-Jun-2023 Introduction of simulation tools, in the **SIMULATE** language, and with the **SIMULATE** command in the **IMAGER** language.

1.3 In Version 3.7 and previous ones down to 3.0

- **Corrected** 06-Sep-2023, **Discovered** 30-Jul-2023 **PIPELINE** was eating too much memory, leading to stall and crash.
- 13-Jun-2023 Ensure the **MODEL** command works correctly on Mosaics.
- **Corrected** 10-Jun-2023, **Discovered** 15-Nov-2022 **UV_RESTORE** in Mosaic mode was leading to subsequent crashes if the channel range is restricted by **UV_MAP** because a single beam cannot be applied to all channels.
This is often the case for ALMA data, because of the shift implied by the Doppler correction when creating the UVFITS files. A work around is to manually drop the edge channels by reading a coherent range of channels, and over-writing the UV data.
- 06-Jun-2023 Introduce the **LOG** command
- 03-Jun-2023 **MAP_POLAR/ANGLE** option to plot B-field directions.
- 25-May-2023 Bug correction in **UV_REWEIGHT** (wrong noise estimate if strong signal).
- 15-May-2023 Improve **PRIMARY** command syntax.
- 03-May-2023 Add the **PLAIT** command.
- **Corrected** 25-Apr-2023 A missing initialization of **CHFLAG** (wrong size) was resulting in flagged visibilities in **/MODE CONT**.
- 24-Mar-2023 Bug correction in **MAP_CONTINUUM**. **SIZE** and **CENTER** units not properly converted.
- **Corrected** 08-Mar-2023 **READ** was not closing properly FITS files when using the cache mechanism.
- **Corrected** 07-Mar-2023 **MASK** was working extremely slowly on 2-D data sets.

- **Corrected** 03-Mar-2023 **UV_SHIFT** was no longer working on degenerate 1-field Mosaic since introduction of the Sault mosaic mode (05-Jan-2023).
- 23-Feb-2023 Significant refurbishment of the plotting scripts and of their documentation and help tools.
- 23-Feb-2023 Implementation of a **COMPARE** command that allows side-by-side comparison of two data cubes.
- **Corrected** 22-Feb-2023 **UV_RESAMPLE**, **UV_COMPRESS**, **UV_HANNING**, **UV_SMOOTH** were no longer handling correctly channels flagged by the **UV_FILTER** command since the introduction of the **UV_FLAG /RESET** option on 03-May-2022.
- 17-Feb-2023 Complete the implementation of **COMBINE** with automatic spectral resampling and spatial reprojection when needed.
- 17-Feb-2023 Support for **INDEX** operation in **MAP_COMBINE** and **COMBINE**, and for blanking values.
- 17-Feb-2023 Ensure **MAP_CONVOLVE** preserves flux when units are in Jy/beam and a proper beam size can be defined.
- 17-Feb-2023 Add support for blanking values in **MAP_RESAMPLE**
- 26-Jan-2023 Allow **SLICE** to call the cursor, and **SHOW** to display degenerate 2-D arrays as a 1-D plot.
- **Corrected** 25-Jan-2023 The **SHOW UV-Like-Data** was crashing, working only for the current UV data.
- 24-Jan-2023 Add the **/DIRECTORY** option to commands **SHOW**, **VIEW**, **EXPLORE**, **INSPECT_3D**.
- 20-Jan-2023 Add the **MAP_CONVOLVE** command to spatially smooth data cubes.
- **Corrected** 20-Jan-2023 The **casagildas()** tool provided by **IMAGER** to CASA to export MS in UVFITS file occasionally produced additional UVFITS files containing only part of the data for some spectral windows. It also sometimes failed on specific spectral setups, where the same frequency occurred for one narrow band and one wide band window.
- 05-Jan-2023 Complete implementation of the SAULT Mosaic construction method. Modified the **MOSAIC** command for this.
- 15-Nov-2022 Add the **/MODE** option to the **PIPELINE** command, with 4 modes: **CONTINUUM**, **SPLIT**, **ALL** or **SURVEY**.
- 14-Nov-2022 Debug use of **MAP_CENTER** variable in various commands (for Mosaics, **UV_SELF** , **UV_SHIFT**).
- 08-Nov-2022 Reorganize commands in languages:**EXTRACT**, **SLICE** and **POPUP** are now part of the **DISPLAY** language
- **Corrected** 08-Sep-2022 Bug correction in **EXTRACT** command.
- 05-Sep-2022 Add the **/ASYMMETRIC** option of **MAP_SMOOTH** and **UV_SMOOTH**

- 05-Jul-2022 Add the **MAP_POLAR** command This corresponds to revision 3.4-1 of the Documentation.
- 29-Jun-2022 Ensure **READ** handles properly Random Frequency Axis in UVFITS format
- 29-Jun-2022 Ensure **UV_EXTRACT** works with Random Frequency Axis
- **Corrected** 29-Jun-2022 **STOKES** command had incorrect derivation from H-V polarization
- **Corrected** 09-Jun-2022 Debug **UV_FLAG** command - Allow to use without Display.
- 22-Apr-2022 Improve **UV_PREVIEW** command
- **Corrected** 13-Apr-2022 **MAP_COMBINE** and **COMBINE** were not supporting big files.
- 12-Apr-2022 Support for command **STOKES** on internal buffers.
- **Corrected** 12-Apr-2022 **UV_RESIDUAL** was not working on a non-sorted Mosaic data set. This could only happen by reading the Clean Component Table after reading the UV data, without any imaging step.

Changes in Version 3.3

- 23-Mar-2022 Introduce the **IMAGER** language. Implement the **PIPELINE** command there, and some miscellaneous (previously user-defined) commands like **TIPS** and **POPUP**

Changes in Version 3.2

- 18-Mar-2022 Add the **CLEAN /RESTART** capability
- 10-Mar-2022 Improve dirty beam related commands behaviour: replace **MAP_BEAM_STEP** by **BEAM_STEP**, use **BEAM_SIZE** to specify beam shape.
- **Corrected** 09-Mar-2022 **CCT_MERGE** Concatenation was improper
- 07-Mar-2022 Allow **WRITE BEAM /APPEND** in all cases
- **Corrected** 07-Mar-2022 Beam size derivation was incorrect when an **ANGLE** was specified
- **Corrected** 08-Feb-2022 **UV_RESTORE** was not using fixed beam size.
- 08-Feb-2022 Implement the **CLEAN_STOP** syntax in **CLEAN**
- **Corrected** 18-Jan-2022, **Discovered** 17-Jan-2022 only **SINGLEDISH** data was incorrectly read, probably since 20-Sep-2021 (v1.53 of read.f90). Improper values were thus used by the **UV_SHORT** command.
- **Corrected** 12-Jan-2022 Mosaic offsets were improperly computed by command **UV_FIELDS** since 29-Jul-2021 (bug reported 10-Jan-2022). The script @ fits_to_uvt was thus leading to wrong pointing offsets.
- 10-Jan-2022 Implement the **LOAD** command in **VIEWER**.
- **Corrected** 10-Jan-2022 A improper interaction between scripts was causing strange behaviour when switching between **EXPLORE** and **INSPECT_3D** commands.

- 07-Jan-2022 Implement `SHOWPV` and improve transposed data display.
- **Corrected** 06-Jan-2022 The `SIC` command `DEFINE IMAGE` failed on large FITS files. This prevented `SHOW` and `VIEW` to work directly from these files.
- 06-Jan-2022 Allow direct `READ` of FITS data cubes.
- 03-Jan-2022 Improve syntax of `COMBINE`
- **Corrected** 18-Dec-2021 `UV_TIME` produced incorrect results on tables with different weights per channel (e.g. those produced by `UV_MERGE /MODE CONCATENATE`).
- 17-Dec-2021 Improve `UV_CHECK BEAM` and `FIT` commands.
- 16-Dec-2021 Add the `UV_MERGE /MODE CONCATENATE` command to stitch adjacent or overlapping spectral windows. Imaging is in general only possible using `BEAM_STEP = 1` after this, so far.
- 13-Dec-2021 Implement a fast, reliable version of "statcont" through the `MAP_CONTINUUM` command (run time < 40 secs for a 28 Gbyte data set on a 64-core machine)
- 13-Dec-2021 Globally revised the Robust weighting scheme. Speed up by huge amount for large (≥ 10 MegaVis) number of visibilities. UV data sorting not required anymore.
- **Corrected** 13-Dec-2021 Remove occasional infinite loop in `MAP_CONTINUUM` with method `GAUSS` (discovered 01-Dec-2021)
- 08-Dec-2021 Change the CASA - GILDAS interface. Use pure-Python scripts and put them in the `$HOME/.casa` directory to have a CASA-version independent solution.
- 07-Dec-2021 A missing initialization was causing `UV_RESTORE` to use the slow mode on some compiler versions.
- 06-Dec-2021 Speed up (by a factor 5-10) the Natural weighting scheme when there is only 1 channel.
- 19-Nov-2021 Create the `VIEWER` program, that only contains the `DISPLAY\` language.
- 19-Nov-2021 Expand the `COMMAND ? Key` mechanism to many commands.
- **Corrected** 18-Nov-2021 `UV_REWEIGHT` syntax bug
- 18-Nov-2021 Add the `STATISTIC /UPDATE` and `FIT /JVM_FACTOR` commands

Changes in Version 3.0

- 31-Oct-2021 Introduce new `DISPLAY\` language. Move commands `CATALOG`, `COLOR`, `FIND`, `EXPLORE`, `INSPECT_3D`, `SHOW`, `STATISTIC`, and `VIEW` from their initial languages to this one.
- Improvements in control variables of `SHOW` and related commands (e.g. allow unit of contours to be specified).
- **Corrected** 28-Jun-2021 `UV_SHIFT` bug correction for "false" mosaics (ID and MOFF columns)

- **Corrected** 28-Jun-2021 **UV_SORT** bug correction for **/FILE** option
- Discovered and **Corrected** 27-Oct-2021 **MAP_INTEGRATE** lead to wrong units and noise level.
- Discovered and **Corrected** 04-Apr-2021 **MULTISCALE** was using an incorrect convergence strategy since years... Results were sub-optimal, and convergence was unduly slow.
- 17-Jun-2021 Add **SPECIFY FREQUENCIES** command for VLA data
- 01-Jun-2021 Allow **MULTISCALE Clean** on Mosaics, better **FIT** command.

1.4 Older Bug corrections

This section contains the list of bugs corrected much longer ago...

Changes up to Version 2.8 dated of Jan 31, 2021

- Discovered and **Corrected** 31-Jan-2021 **UV_MAP /RANGE** was producing a wrong velocity/frequency axis since 11-Dec-2020. (a line of code had disappeared).
- 14-Dec-2020 **SPECTRAL_CLEAN** command
- 31-Jan-2020 Add **CCT_CLEAN** command
- 13-Nov-2020 Add **MAP_SMOOTH** command
- 26-Oct-2020 Add **UV_SMOOTH** command
- 11-Sep-2020 Add **KEPLER /MASK** command for Mask creation
- 03-Sep-2020 Better behaviour of command **UV_TIME**
- 01-Sep-2020 Improve **FIT** command for Mosaics

Changes since Version 2.5 of Feb 27th, 2020, and older ones.

- Discovered and **Corrected** 10-Dec-2020 **MODEL** after **UV_FIT** was ending with an undue error (bug present since 2-Jun-2020)
- **Corrected** 8-Dec-2020 Mosaic offsets were not accounted for properly since 19-Jun-2019. The reason was a misplaced exclamation mark that transformed a key instruction into a comment in the code file. Anomalous behaviour of the Mosaic mode were reported end of November, and a test case isolated on Dec 7 for analysis, leading a prompt correction.
- 13-Nov-2020 Speed-up the **UV_RESTORE** command.
- **Corrected** 26-Oct-2020 Several bugs in **UV_MERGE** made it fail on some (usually large) data files, sometimes depending on the order in which they were given (discovered 15-Oct-2020).
- **Corrected** 14-Sep-2020 Incorrect transfer of self-calibration solution in **APPLY** and **SELFAPPLY** on some UV data set from ALMA.
- **Corrected** 11-Sep-2020 **KEPLER** was off by 1 pixel.
- **Corrected** 11-Sep-2020 Blanking was not updated in **MASK APPLY**

- **UV_SHORT /REMOVE** does not properly delete the **SHORT%** variable in some cases, in particular if command **XY_SHORT** is (or has been) used (discovered 15-Feb-2020, still pending, difficult to reproduce).
- 30-Jul-2020 Miscellaneous improvements in the **KEPLER** command
- **Corrected** 10-Jul-2020 **IMAGER** occasionally crashed after a sequence of **UV_MAP /CONT** and **UV_RESTORE** commands, because of a map size mismatch. This size mismatch occurred when the baseline min-max of the UV data set are inconsistent with the UV data. (discovered 07-Jul-2020).
- **Corrected** 10-Jun-2020 **KEPLER** did not handle **KEPLER_X0** and **KEPLER_Y0** properly.
- **Corrected** 20-May-2020 **FITS** failed on large (300 GBytes..) UVFITS files. (discovered 15-Feb-2020).
- 26-May-2020 Implementation of the **UV_DETECT** command, that encapsulates all actions needed for matched filtering in UV plane.
- 14-May-2020 Proper implementation of the **UV_CORRELATE** command, that performs matched filtering in the UV plane
- 13-May-2020 **MODEL** defines the **UV_MODEL** variable
- 25-Mar-2020 Implementation of the **KEPLER** command, that allows optimal detection of spectral lines in Keplerian disks, and estimates of radial profiles.
- 19-Mar-2020 Proper implementation of the **MODEL** command, with the **MODEL /MODE** option and several channels.
- **Corrected** 19-Mar-2020 **MODEL /MINVAL** threshold was erroneously transformed between Jy/beam and K.
- 11-Mar-2020 Command **EXPLORE** added to language **BUNDLES**
- 10-Mar-2020 **CASA** to **GILDAS** interface
The **casagildas()** tool has been totally re-written in pure Python to avoid issues with incompatible releases of Fortran compilers and Python between **CASA** and **GILDAS**
- **Corrected** 10-Mar-2020 **MAP_RESAMPLE** may crash on some combination of values (discovered 10-Mar-2020).
- **Corrected** 10-Mar-2020 **VIEW** may fails the **RANGE** is non zero and the 3rd axis increment is negative.
- corrected 05-Mar-2020 **UV_MAP** fails after **UV_RESIDUAL** and **SELECT UV_RESIDUAL** if the initial UV data set was not sorted in **XY**.
- **Corrected** 05-Mar-2020 **MULTI** with non-zero value for **CLEAN_NITER** did not set up properly the number of components (it finds 0). **SHOW CCT** and **UV_RESTORE** could not be used after.
- 27-Feb-2020 **UV_SHORT** now allows to use images with non-circular beams as short spacings data. Such images can be, for example, an ACA image to be combined with ALMA data.

- 24-Feb-2020 `imager-linedb.sic` script converted to Python 2 and 3 compatible syntax
- 21-Feb-2020 `UV_MAP` was crashing on Mosaic in Robust weighting. Linked to a missing (although optional !) argument to call `doweig`, despite the interface was used.
- 18-Feb-2020 3D size was incorrectly set by `UV_MAP` on "huge" file (1200 x 1200 x 3840).
- 14-Feb-2020 Normalize message colours.
- 14-Feb-2020 Suppress blanking when not needed
- 13-Feb-2020 Make `UV_MERGE` compliant with its Help: allow to merge Line data sets in Continuum mode.
- 10-Feb-2020 `SLICE` command changes.
The `SLICE` buffer had to be renamed to `SLICED`, as "slice()" is a built-in Python method. The axis starts now from the closest point to (0,0), leading to more intuitive slices.
- 06-Feb-2020 `MAP_COMPRESS` syntax was incorrectly handled. The `HELP MAP_COMPRESS` is still unclear, however.
- 18-Dec-2019 `VIEW CCT` optimized by coding the component compression after a `MULTI`.
- 17-Dec-2019 `SELFCAL` optimization (was using slow mode in `UV_RESTORE` by default).
- 27-Nov-2019 `UV_CHECK /FILE` implemented.
- 27-Nov-2019 `UV_TIME /FILE` implemented.
- 27-Nov-2019 `UV_SHIFT /FILE` implemented.
- 20-Nov-2019 Make sure `UV_PREVIEW` also works for 1 channel.

2 Revision History

This section contains a verbatim revision history taken from the `IMAGER` code. Except for minor typos or cosmetic changes, each modification in the code is documented by 1 line of code that includes three informations:

- The language revision number of the affected command
- the date of the revision
- a short description of the change

`IMAGER` only gives the major revision number at start of program. The individual revision numbers of all its languages can be obtained using command `SIC VERSION`. This information can be useful for users encountering a suspected bug or strange behaviour, allowing him/her to see whether the problem has been handled since the version of `IMAGER` they use.

```

character(len=20) :: v_program    ! UV_SHORT improvement
  v_program = '3.6-01 24-Nov-2022' ! Global IMAGER Version (matching Documentation)
  v_program = '3.6-02 13-Dec-2022' ! MODEL works on Mosaic
  v_program = '3.7-00 05-Jan-2023' ! UV_MAP with Sault method for Mosaics
  v_program = '3.7-02 25-Jan-2023' ! /DIRECTORY option in DISPLAY commands
  v_program = '3.7-03 24-Feb-2023' ! Full capabilities of COMBINE command
  v_program = '3.7-04 10-Jun-2023' ! UV_SHORT, PRIMARY, PLAIT and MAP_POLAR commands
  v_program = '3.7-05 13-Jun-2023' ! Debug MODEL
  v_program = '3.8-01 25-Jun-2023' ! SIMULATE\ language
  v_program = '3.8-02 05-Jul-2023' ! SIMULATE command
  v_program = '3.8-04 07-Jul-2023' ! Bug corrections for Mosaics & UV_SHORT
  v_program = '3.8-05 21-Jul-2023' ! Bug correction COMBINE - Improve COMPARE
  v_program = '3.9-01 25-Jul-2023' ! SELFCAL for Mosaics+ SHOW /OVERLAY
  v_program = '3.9-02 29-Aug-2023' ! UV_SHORT improvement
  v_program = '3.9-03 07-Sep-2023' ! BEAM_GAP control and UV_RESTORE / COMBINE fixes
  v_program = '3.9-05 18-Sep-2023' ! SIMULATE & CATALOG bug correction
  v_program = '3.9-06 05-Oct-2023' ! CATALOG, UV_MERGE & UV_CORRELATE bugs correction
  v_program = '3.9-07 18-Oct-2023' ! CCT_CONVERT & MASK corrections
  v_program = '3.9-08 20-Oct-2023' ! CLEAN /RESTART bug correction - SHOW MOMENTS improved
  v_program = '3.9-08 13-Nov-2023' ! SELFCAL issues, MAP_COMBINE INDEX and UV_FIT parameters
  v_program = '3.9-09 27-Nov-2023' ! Installation scripts & Verification procedure
  v_program = '3.9-10 04-Dec-2023' ! Display scripts on non-standard cubes
  v_program = '3.9-11 09-Jan-2024' ! Protect for flagged data in Robust weighting & UV_ST
v_program = '4.0-00 05-Mar-2024' ! PIPELINE /MODE SURVEY bug correction
v_program = '4.0-01 05-Mar-2024' ! UV_PREVIEW bug correction
v_program = '4.0-02 05-Apr-2024' ! Update PIPELINE scripts

```

2.1 DISPLAY Language

```

character(len=20) :: v_display    ! Display
! DISPLAY\ Language versions v_display
v_display = '1.0-00 21-Oct-2021' ! First DISPLAY\ Language
v_display = '1.2-00 23-Oct-2021' ! Also move EXPLORE here
v_display = '1.3-00 23-Oct-2021' ! Also move STATISTIC here
v_display = '1.3-01 10-Nov-2021' ! Improve CATALOG command
v_display = '1.4-00 18-Nov-2021' ! STATISTIC /UPDATE command
v_display = '1.4-01 23-Nov-2021' ! Allow re-entrant calls for STATISTIC
v_display = '1.5-00 10-Jan-2022' ! LOAD command
v_display = '1.5-01 30-Jan-2022' ! Improve CATALOG command
v_display = '1.5-06 16-May-2022' ! Ensure STATISTIC works correctly on big data
v_display = '1.6-00 14-Oct-2022' ! Include the SPECTRUM command calling GreG code
v_display = '1.6-01 15-Oct-2022' ! Include the POPUP command
v_display = '1.6-02 04-Nov-2022' ! Include the SET command
v_display = '1.6-03 07-Nov-2022' ! Add the /DEFAULT option to the SET command
v_display = '1.7-00 08-Nov-2022' ! Move the EXTRACT and SLICE command here
v_display = '1.7-01 05-Jan-2023' ! SHOW MOSAIC
v_display = '1.8-00 23-Jan-2023' ! /DIRECTORY option of all effective Display commands
v_display = '1.8-01 25-Jan-2023' ! SHOW UV-Like data

```

```

v_display = '1.8-02 25-Jan-2023' ! SLICE can call the cursor if no arg.
v_display = '1.9-00 25-Jan-2023' ! Add the COMPARE command
v_display = '1.9-01 08-Mar-2023' ! EXTRACT was not handling ANGLE_UNIT correctly
v_display = '1.9-02 02-Jun-2023' ! FIND /CHECK option
v_display = '1.9-03 12-Jul-2023' ! CATALOG /SORT option
v_display = '1.9-04 21-Jul-2023' ! Improved COMPARE command
v_display = '1.9-05 25-Jul-2023' ! Improve STATISTIC command for Mosaics
v_display = '1.9-06 25-Jul-2023' ! SHOW /OVERLAY command
v_display = '1.9-07 09-Jan-2024' ! Better SHOW & VIEW of non standard data cubes (scripts on)
v_display = '1.9-08 05-Mar-2024' ! STATISTIC /FILE command
v_display = '1.9-09 05-Apr-2024' ! SHOW COMPOSITE improvement

```

2.2 CLEAN Language

```

character(len=20) :: v_clean      ! CLEAN
! CLEAN Language versions  v_clean
v_clean = '4.0-01 08-Mar-2018' ! First IMAGER release with new Variable names (may still char
v_clean = '4.1-01 08-Mar-2018' ! IMAGER release with Self Calibration commands
v_clean = '4.1-02 15-Mar-2018' ! Bug correction in Self Calibration commands
v_clean = '4.1-02 02-May-2018' ! Split with CALIBRATE\ language
v_clean = '4.2-01 03-Jul-2018' ! Add /RANGE options to UV_FILTER and UV_BASELINE
v_clean = '4.3-01 05-Sep-2018' ! Minor change in SHOW NOISE to identify properly Dirty and C
v_clean = '4.3-02 05-Nov-2018' ! Debug MX, improve MULTI and cleanup messages
v_clean = '4.3-03 14-Nov-2018' ! Add the UV_TRIM command, support READ CCT /RANGE
v_clean = '4.4-01 14-Jan-2019' ! Add the UV_HANNING command
v_clean = '4.4-02 17-Jan-2019' ! Add the UV_EXTRACT command
v_clean = '4.4-03 04-Feb-2019' ! Add the /FILE option to UV_BASELINE,UV_FILTER, UV_SPLIT and
v_clean = '4.4-04 07-Feb-2019' ! Bug correction in UV_MAP for Phase offset mosaics
v_clean = '4.4-05 08-Feb-2019' ! UV_TRIM /FILE syntax
v_clean = '4.4-06 12-Feb-2019' ! Protect against incomplete UV data (Nvisi < dim(2))
v_clean = '4.4-07 13-Feb-2019' ! Operational version of UV_SORT /FILE (still slow)
v_clean = '4.4-08 14-Feb-2019' ! Operational version of UV_SORT /FILE (reasonable now)
v_clean = '4.4-09 15-Feb-2019' ! UV_TIME /FILE syntax
v_clean = '4.4-10 25-Feb-2019' ! UV_RESAMPLE, UV_COMPRESS, UV_HANNING /FILE syntax
v_clean = '4.5-01 27-Feb-2019' ! Move STOKES command to ADVANCED\ language
v_clean = '4.5-02 14-Mar-2019' ! Improve the STATISTIC and SUPPORT commands behaviour
v_clean = '4.5-03 29-Mar-2019' ! Support for SHOW SOURCES
v_clean = '5.0-01 05-Apr-2019' ! Remove CLARK, ..., SDI commands, leave only CLEAN
v_clean = '5.0-02 05-Apr-2019' ! Move COLOR to CLEAN\
v_clean = '5.0-03 29-Apr-2019' ! Option /CONT for UV_MAP
v_clean = '5.0-04 02-May-2019' ! BUFFERS command
v_clean = '5.0-05 06-May-2019' ! /NOPAUSE option to VIEW command
v_clean = '5.0-06 07-May-2019' ! UV_STAT DEFAULT and associated variables
v_clean = '5.0-07 25-May-2019' ! /INDEX option for UV_MAP
v_clean = '5.1-01 05-Jun-2019' ! Command UV_REWEIGHT re-written
v_clean = '5.1-02 15-Jun-2019' ! UV_EXTRACT /FIELDS
v_clean = '5.1-03 25-Jun-2019' ! UV_FIELDS command
v_clean = '5.1-04 03-Jul-2019' ! UV_COMPRESS /CONTINUUM option

```

```

v_clean = '5.1-05 04-Jul-2019' ! Remove obsolete /SELF option of UV_MAP & UV_RESTORE
v_clean = '5.2-01 03-Sep-2019' ! Move STATISTIC command out of this language
v_clean = '5.2-02 13-Sep-2019' ! Move UV_SORT command out of this language
v_clean = '5.2-03 25-Sep-2019' ! UV_FLAG bug correction
v_clean = '5.2-04 07-Oct-2019' ! UV_MAP 'Map_Center' bug correction (header not updated)
v_clean = '5.2-05 10-Oct-2019' ! WRITE does not accept ambiguities
v_clean = '5.2-06 10-Oct-2019' ! VIEW with no argument just re-displays
v_clean = '5.3-01 10-Oct-2019' ! Support for the CONTINUUM image
v_clean = '5.3-02 11-Oct-2019' ! MAP_REPROJECT, MAP_COMBINE commands (+syntax MAP_RESAMPLE)
v_clean = '5.3-03 13-Oct-2019' ! SHOW /NOPAUSE and VIEW /OVERLAY commands
v_clean = '5.3-04 16-Oct-2019' ! SHOW /SIDE instead of /NOPAUSE and new MASK THRESHOLD command
v_clean = '5.3-05 06-Nov-2019' ! /FILE option of UV_CHECK
v_clean = '5.3-06 20-Nov-2019' ! /FILE option of UV_SHIFT
v_clean = '5.3-07 06-Feb-2020' ! Bug correction for MAP_COMPRESS syntax
v_clean = '5.3-08 20-Feb-2020' ! Size computation for Large data set may exceed 2GBytes
v_clean = '5.3-09 21-Feb-2020' ! Bug correction for Mosaic in Robust weighting
v_clean = '5.3-10 24-Feb-2020' ! /LIKE option of MAP_RESAMPLE
v_clean = '5.3-11 05-Mar-2020' ! Bug correction in MULTI
v_clean = '5.3-12 05-Mar-2020' ! Bug correction about buffers selected by UV_SELECT and/or UV_COPY
v_clean = '5.3-13 11-Mar-2020' ! Bug correction in MAP_RESAMPLE (overflow of channel ranges)
v_clean = '5.3-14 25-Mar-2020' ! Remove a restriction in MAP_RESAMPLE (overflow of channel ranges)
v_clean = '5.3-15 25-Mar-2020' ! Improve the /FLUX display in CLEAN command
v_clean = '5.3-16 13-May-2020' ! Improve the WRITE MODEL command
v_clean = '5.4-01 21-May-2020' ! /FOR option of SPECIFY
v_clean = '5.4-02 09-Jul-2020' ! Command DISCARD
v_clean = '5.4-03 01-Sep-2020' ! Option /THRESHOLD for command FIT
v_clean = '5.4-04 03-Sep-2020' ! Improve UV_TIME command : more consistent defaults
v_clean = '5.4-05 11-Sep-2020' ! Bug correction in MASK APPLY (Blanking was not updated)
v_clean = '5.4-06 15-Sep-2020' ! Optimize MAP_RESAMPLE if no resampling needed
v_clean = '5.5-01 26-Oct-2020' ! Command UV_SMOOTH
v_clean = '5.6-01 07-Dec-2020' ! Command CCT_MERGE and CCT_CONVERT
v_clean = '5.6-02 14-Dec-2020' ! STATISTIC /EDGE option
v_clean = '5.6-03 14-Dec-2020' ! /ARES Argument must be Real array
v_clean = '5.6-04 14-Jan-2021' ! Debug VIEW and SHOW 4-D Beams
v_clean = '5.6-05 19-Jan-2021' ! Make sure UV_MAP works on Mosaics even in Memory limited condition
v_clean = '5.7-01 31-Jan-2021' ! Command CCT_CLEAN
v_clean = '5.7-02 31-Mar-2021' ! FIT command make one fit per pointing
v_clean = '5.7-03 01-Apr-2021' ! MULTISCALE is now operational for Mosaics
v_clean = '5.7-04 01-Jun-2021' ! Bug correction for MULTISCALE in 4-D Beams
v_clean = '5.7-05 01-Jun-2021' ! More flexible FIT command
v_clean = '5.8-01 17-Jun-2021' ! SPECIFY FREQUENCIES command for VLA data
v_clean = '5.8-02 28-Jun-2021' ! UV_SHIFT bug correction for "false" mosaics (ID and MOFF commands)
v_clean = '5.8-03 28-Jun-2021' ! UV_SORT bug correction for /FILE option
v_clean = '6.0-00 21-Oct-2021' ! Split Language CLEAN\ into CLEAN\ and DISPLAY\ (no \at end of line)
v_clean = '6.0-01 09-Nov-2021' ! Bug correction in READ UV: undefine PREVIEW%, avoid write UV
v_clean = '6.1-00 17-Nov-2021' ! Add /JVM option to command FIT
v_clean = '6.1-01 17-Nov-2021' ! CLEAN Variable ? syntax

```

```

v_clean = '6.1-02 17-Nov-2021' ! UV_MAP Variable ? syntax
v_clean = '6.1-03 19-Nov-2021' ! UV_REWEIGHT syntax bug correction
v_clean = '6.1-04 23-Nov-2021' ! Use the BEAM_JVM value in UV_RESTORE - (Defaults to 1 if no
v_clean = '6.2-00 02-Dec-2021' ! Add the /LIKE option to UV_RESAMPLE
v_clean = '6.2-01 16-Dec-2021' ! Optimize parallel processing
v_clean = '6.2-02 17-Dec-2021' ! Debug MAP_BEAM_STEP = 1 mode
v_clean = '6.2-03 17-Dec-2021' ! UV_CHECK beam works better
v_clean = '6.2-04 18-Dec-2021' ! UV_TIME now works for UV tables with per-channel weights
v_clean = '6.2-05 20-Dec-2021' ! UV_RESAMPLE must reset BEAM_RANGES variable
v_clean = '6.3-00 21-Dec-2021' ! Use new way of defining Dirty Beams number and properties.
v_clean = '6.3-01 03-Jan-2021' ! Parallel programming optimization for CLEAN
v_clean = '6.3-02 06-Jan-2022' ! Allow direct READ of FITS data cubes.
v_clean = '6.3-03 07-Jan-2022' ! READ /PLANES option now works as expected
v_clean = '6.3-04 11-Jan-2022' ! UV_FIELD bug correction
v_clean = '6.3-05 18-Jan-2022' ! READ SINGLE bug correction
v_clean = '6.3-06 20-Jan-2022' ! READ with FITS format improvement
v_clean = '6.3-07 08-Feb-2022' ! Allow to use Fixed beamsize in UV_RESTORE
v_clean = '6.3-08 08-Feb-2022' ! CLEAN_STOP syntax in CLEAN
v_clean = '6.3-09 07-Mar-2022' ! Allow WRITE BEAM /APPEND in all cases
v_clean = '6.3-10 07-Mar-2022' ! Bug correction in beam derivation if ANGLE is specified
v_clean = '6.3-11 09-Mar-2022' ! Bug correction in CCT_MERGE : Concatenation was improper
v_clean = '6.4-00 18-Mar-2022' ! Implement the /RESTART option of CLEAN
v_clean = '6.4-01 22-Mar-2022' ! Flag out of band channels in UV_RESAMPLE
v_clean = '6.4-02 03-May-2022' ! /RESET option of UV_FILTER
v_clean = '6.4-03 10-May-2022' ! Bug correction in UV_SHIFT and PROPER_MOTION
v_clean = '6.4-04 02-Jun-2022' ! Make SPECIFY TELESCOPE work on Images too
v_clean = '6.4-05 09-Jun-2022' ! Debug UV_FLAG command
v_clean = '6.4-06 29-Jun-2022' ! Make UV_EXTRACT work with Random Frequency Axis
v_clean = '6.4-07 29-Jun-2022' ! Make READ handle properly Random Frequency Axis in UVFITS f
v_clean = '6.5-00 05-Sep-2022' ! Add the /ASYMMETRIC option of MAP_SMOOTH and UV_SMOOTH
v_clean = '6.5-01 27-Sep-2022' ! Add the UNIT specifier to MAP_REPROJECT
v_clean = '6.5-02 07-Oct-2022' ! Bug correction in Beam Consistency checking
v_clean = '6.5-03 10-Oct-2022' ! Use a Channel mask array to hide line-emitting parts of the
v_clean = '6.5-04 07-Nov-2022' ! Make sure MAP_CENTER is also used for Mosaics
v_clean = '6.5-05 14-Nov-2022' ! Bug in UV_SHIFT: Pointing center was incorrectly reset in /1
v_clean = '6.5-06 14-Nov-2022' ! Bug in UV_MOSAIC: Wrong identification of arguments
v_clean = '6.5-07 14-Nov-2022' ! Make sure MAP_CENTER is never forgotten (Mosaic stills need
v_clean = '6.5-08 15-Nov-2022' ! UV_TIME crashed on Mosaics
v_clean = '6.6-00 19-Dec-2022' ! Prepare UV_MAP with Sault Method for Mosaics, using the MOSA
v_clean = '6.6-01 05-Jan-2023' ! Working version of UV_MAP with Sault Method for Mosaics, us
v_clean = '6.6-02 05-Jan-2023' ! all "TRUNCATE" values are now in [0,1] (instead of % in some
v_clean = '6.6-03 20-Feb-2023' ! MAP_CONVOLVE now preserves flux when possible. MAP_RESAMPLE
v_clean = '6.6-04 23-Feb-2023' ! UV_STAT better handles Recommended vs User specified sizes
v_clean = '6.6-05 03-Mar-2023' ! UV_CHECK uses BEAM_TOLERANCE
v_clean = '6.6-06 03-Mar-2023' ! Bug correction in UV_SHIFT for degenerate 1 field Mosaic
v_clean = '6.6-07 08-Mar-2023' ! Bug correction in READ for FITS files (file left open in op
v_clean = '6.6-08 08-Mar-2023' ! UV_CHECK BEAM uses an improved method (ignore per-channel s

```



```

v_clean = '6.6-09 15-May-2023' ! PRIMARY command syntax improved, backward compatible
v_clean = '6.6-10 25-May-2023' ! UV_REWEIGHT bug correction
v_clean = '6.7-00 06-Jun-2023' ! LOG command
v_clean = '6.7-01 10-Jun-2023' ! Bug correction for UV_RESTORE in Mosaics.
v_clean = '6.7-02 07-Jul-2023' ! READ UV in UVFITS format was broken on Mosaics.
v_clean = '6.7-03 07-Jul-2023' ! SPECIFY /FOR was not working
v_clean = '6.7-04 13-Jul-2023' ! Improvements and Bug corrections in UV_STAT
v_clean = '6.7-05 13-Jul-2023' ! READ Item FileFilter opens a file search window
v_clean = '6.7-06 28-Aug-2023' ! SPECIFY command syntax: BLANKING, FREQUENCY and SPECUNIT
v_clean = '6.7-07 04-Sep-2023' ! Introduce BEAM_GAP and verify Weight channel more clearly
v_clean = '6.7-08 06-Sep-2023' ! DUMP MEM command and IMAGER_RAM variable
v_clean = '6.7-09 07-Sep-2023' ! Proper handling of Memory limit in UV_RESTORE and UV_RESIDU
v_clean = '6.7-10 04-Oct-2023' ! UV_CHECK improvements and UV_CONTINUUM using the Code_uvt_I
v_clean = '6.7-11 18-Oct-2023' ! CCT_CONVERT flux scale correction
v_clean = '6.7-12 20-Oct-2023' ! CLEAN /RESTART bug correction
v_clean = '6.7-13 13-Nov-2023' ! MAP_COMBINE INDEX bug correction
v_clean = '6.7-14 09-Jan-2024' ! Ensure flagged data are not used in Robust weighting estimat
v_clean = '6.8-00 05-Mar-2024' ! Improved PRIMARY command, WRITE CCT /APPEND support
v_clean = '6.8-01 08-Mar-2024' ! Debug UV_PREVIEW for Confused spectra
v_clean = '6.8-02 10-Mar-2024' ! Update fits-to-uvt.ima and debug UV_REWEIGHT /FILE

```

2.3 ADVANCED Language

```

character(len=20) :: v_advanced ! ADVANCED
! ADVANCED\ Language versions v_advanced
v_advanced = '1.0-01 01-Dec-2017' ! Command UV_PREVIEW
v_advanced = '1.0-02 08-Mar-2018' ! Commands UV_DEPROJECT and UV_RADIAL
v_advanced = '1.1-02 08-Mar-2018' ! Commands MODEL, SOLVE /MODE, CALIBRATE and UV_MAP /SELF
v_advanced = '1.2-01 10-Apr-2018' ! Template for Command UV_SHORT
v_advanced = '1.2-02 26-Apr-2018' ! Operational Command UV_SHORT - Still problems with repet
v_advanced = '1.3-01 03-Jul-2018' ! Rename CALIBRATE into APPLY -- Split with CALIBRATE\ lang
v_advanced = '1.3-02 26-Sep-2018' ! Add SLICE and EXTRACT commands
v_advanced = '1.3-03 26-Sep-2018' ! allow support for VIEW (or SHOW) AnySicImage
v_advanced = '1.3-04 26-Sep-2018' ! UV_PREVIEW bug correction
v_advanced = '1.4-01 23-Nov-2018' ! Rename language to ADVANCED, and insert SELFCAL command
v_advanced = '1.4-02 26-Nov-2018' ! Add UV_FIT command
v_advanced = '1.4-03 28-Nov-2018' ! Add MOMENTS command
v_advanced = '1.4-04 28-Nov-2018' ! Add CATALOG command
v_advanced = '1.4-05 15-Jan-2019' ! Better version of the CATALOG command - Drives a script
v_advanced = '1.4-06 23-Jan-2019' ! Correction of a bug in UV_PREVIEW
v_advanced = '1.5-01 24-Jan-2019' ! Add the ADVANCED\MASK command
v_advanced = '1.5-02 04-Feb-2019' ! Debug the UV_FIT command -- Add the /FILE option for UV_I
v_advanced = '1.6-01 26-Feb-2019' ! Add the UV_ADD command (similar to UV_DOPPLER in ASTRO)
v_advanced = '1.6-02 27-Feb-2019' ! Move the STOKES command from the Clean\ language
v_advanced = '1.6-03 19-Mar-2019' ! Add the UV_MERGE command (simpler than the task...)
v_advanced = '1.6-04 20-Mar-2019' ! Add the COLOR and FLUX commands
v_advanced = '1.6-05 28-Mar-2019' ! /SAVE option of UV_FIT
v_advanced = '1.6-06 14-May-2019' ! HOW_TO command

```

```

v_advanced = '1.7-01 19-May-2019' ! FEATHER command
v_advanced = '1.7-02 24-May-2019' ! XY_SHORT command
v_advanced = '1.8-01 20-Jul-2019' ! UV_CIRCLE command
v_advanced = '1.8-02 22-Jul-2019' ! /RESULT option of UV_FIT command
v_advanced = '1.8-03 31-Jul-2019' ! PROPER_MOTION command
v_advanced = '1.8-04 23-Sep-2019' ! Improved UV_FIT command
v_advanced = '1.8-05 16-Oct-2019' ! COMBINE command
v_advanced = '1.8-06 17-Oct-2019' ! FLUX and MAP_CONTINUUM commands bug correction
v_advanced = '1.9-00 29-Nov-2019' ! Move the COMBINE and SELFCAL to the BUNDLES\ language
v_advanced = '1.9-01 20-Jan-2020' ! Speed-up (considerably) UV_PREVIEW
v_advanced = '1.9-02 20-Jan-2020' ! Add the UV_CORRELATE command
v_advanced = '1.9-03 06-Feb-2020' ! Change name of SLICE buffer to SLICED for Python
v_advanced = '1.9-04 12-Feb-2020' ! Allow UV_MERGE to merge Line tables in CONTINUUM mode
v_advanced = '1.9-05 17-Feb-2020' ! UV_PREVIEW bug correction. Also affects MAP_CONTINUUM
v_advanced = '1.9-06 18-Feb-2020' ! Improved STATISTIC command
v_advanced = '2.0-00 19-Feb-2020' ! MOMENTS /CUTS option and improved SHOW MOMENTS
v_advanced = '2.0-01 20-Feb-2020' ! UV_SHORT ? proper support
v_advanced = '2.0-02 20-Feb-2020' ! UV_SHORT with non-circular Short-Spacing beam
v_advanced = '2.0-03 26-Feb-2020' ! UV_SHORT /CHECK option
v_advanced = '2.1-00 27-Feb-2020' ! UV_SHORT with minimum baseline and single-fields
v_advanced = '2.1-01 29-Mar-2020' ! Improvements in MOMENTS
v_advanced = '2.1-02 13-May-2020' ! Improvements in UV_CORRELATE
v_advanced = '2.1-03 14-May-2020' ! Bug correction in UV_PREVIEW and UV_CORRELATE
v_advanced = '2.1-04 28-May-2020' ! UV_PREVIEW /BROWSE command
v_advanced = '2.1-05 10-Jun-2020' ! UV_PREVIEW /FILE Fich [Drop] command
v_advanced = '2.1-07 26-Oct-2020' ! Debug completely UV_MERGE command (or 2021 ?)
v_advanced = '2.2-00 26-Oct-2021' ! Move CATALOG and FIND to DISPLAY\ Language
v_advanced = '2.2-01 18-Nov-2021' ! UV_SHORT V 3.9 syntax and Help improvement
v_advanced = '2.3-00 26-Nov-2021' ! MAP_CONTINUUM /METHOD option
v_advanced = '2.4-00 02-Dec-2021' ! UV_MOSAIC command
v_advanced = '2.4-01 19-Dec-2021' ! UV_MERGE /MODE CONCATENATE command
v_advanced = '2.4-02 19-Dec-2021' ! EXTRACT and SLICE syntax improvements.
v_advanced = '2.4-03 19-Dec-2021' ! EXTRACT now allows expansion
v_advanced = '2.4-04 08-Feb-2022' ! UV_FIT prints primary beam corrected flux
v_advanced = '2.4-05 17-Apr-2022' ! STOKES can now work on internal buffer
v_advanced = '2.4-06 22-Apr-2022' ! UV_PREVIEW syntax change & improvement
v_advanced = '2.4-07 25-May-2022' ! MOMENTS SMOOTH keyword
v_advanced = '2.4-08 07-Jun-2022' ! UV_FIT /UVRANGE Min Max
v_advanced = '2.4-09 29-Jun-2022' ! STOKES: Correct derivation from H-V polarization
v_advanced = '2.5-00 05-Jul-2022' ! First operational version of MAP_POLAR
v_advanced = '2.5-01 08-Sep-2022' ! Bug correction in EXTRACT command
v_advanced = '2.5-02 13-Oct-2022' ! Allow adding columns in UV_ADD /FILE
v_advanced = '2.6-00 08-Nov-2022' ! Move EXTRACT and SLICE to DISPLAY\ language
v_advanced = '2.6-01 24-Nov-2022' ! Reload the MASK after a user specified modification if in
v_advanced = '2.6-02 24-Jan-2023' ! SOLVE uses the SELF_GAIN convergence factor
v_advanced = '2.6-03 08-Mar-2023' ! MASK works again on 2-D data cubes (p_mask.ima)
v_advanced = '2.6-04 27-Mar-2023' ! MAP_CONTINUUM SIZE and CENTER units correction

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```

v_advanced = '2.6-05 02-Jun-2023' ! MAP_POLAR /ANGLE option
v_advanced = '2.6-06 07-Jul-2023' ! UV_SHORT bug corrections
v_advanced = '2.6-06 29-Aug-2023' ! UV_SHORT command improvement (handle BLANKING and resamp)
v_advanced = '2.6-07 07-Sep-2023' ! Fixed COMBINE memory leak
v_advanced = '2.6-07 18-Sep-2023' ! Bug correction in frequency units in CATALOG
v_advanced = '2.6-08 26-Sep-2023' ! Bug correction in CSV CATALOG line names
v_advanced = '2.6-09 03-Oct-2023' ! UV_MERGE, UV_CORRELATE & UV_DETECT bugs correction
v_advanced = '2.6-10 18-Oct-2023' ! MASK LABEL command
v_advanced = '2.7-00 20-Oct-2023' ! MASK Improvement and UV_FIT /SAVE modification
v_advanced = '2.7-09 13-Nov-2023' ! Correct UV_FIT for many parameters

```

2.4 CALIBRATE Language

```

character(len=20) :: v_cal      ! CALIBRATE
! CALIBRATE\ Language versions v_cal
v_cal = '1.0-01 03-Jul-2018' ! Split with CALIBRATE\ language
v_cal = '1.1-01 07-Jul-2018' ! /MINVAL option instead of /MINFLUX for MODEL
v_cal = '1.2-01 20-Mar-2019' ! Rename command FLUX_SCALE into SCALE_FLUX
v_cal = '1.3-01 16-Jul-2019' ! Command COLLECT
v_cal = '1.3-02 16-Jul-2019' ! Command DERIVE
v_cal = '1.4-01 03-Sep-2019' ! Move STATISTIC command to this language
v_cal = '1.4-02 06-Sep-2019' ! Implement UV_SELECT selection command
v_cal = '1.4-03 13-Sep-2019' ! Move UV_SORT command to this language
v_cal = '1.4-04 26-Sep-2019' ! APPLY command modification ((weights and flags, r1.11)
v_cal = '1.5-01 08-Nov-2019' ! COLLECT /FLAG option and bug correction
v_cal = '1.6-01 17-Jan-2020' ! FIND Fmin Fmax command
v_cal = '1.7-01 19-Mar-2020' ! MODEL /MODE IMAGE implemented.
v_cal = '1.7-04 13-May-2020' ! MODEL command defines UV_MODEL
v_cal = '1.7-05 26-May-2020' ! Finish MODEL /MODE IMAGE implementation
v_cal = '1.7-06 15-Sep-2020' ! Add time tolerance in command APPLY
v_cal = '1.8-00 28-Oct-2021' ! Move STATISTIC command to DISPLAY\ language
v_cal = '1.8-01 11-Jan-2022' ! Protect MODEL against undefined data units.
v_cal = '1.8-02 17-Jan-2022' ! Add the Frequency keyword to MODEL /MODE
v_cal = '1.8-03 13-Dec-2022' ! Make MODEL works on Mosaics
v_cal = '1.8-04 15-Dec-2022' ! Make UV_MAP /FIELD works for Mosaics
v_cal = '1.9-00 03-May-2023' ! Add PLAIT command
v_cal = '1.9-02 24-Jul-2023' ! UV_SELF supports Mosaics now
v_cal = '1.9-03 03-Oct-2023' ! UV_SELF no longer works on "pseudo-continuum" data
v_cal = '1.9-04 09-Nov-2023' ! UV_SELF should force weight recomputation when starting.

```

2.5 BUNDLES Language

```

character(len=20) :: v_bundles ! BUNDLES
! BUNDLES\ Language versions v_bundles
v_bundles = '1.0-00 29-Nov-2019' ! Move the COMBINE and SELFCAL to the BUNDLES\ language
v_bundles = '1.1-00 11-Mar-2020' ! Add the EXPLORE tool
v_bundles = '1.2-00 25-Mar-2020' ! Add the KEPLER tool
v_bundles = '1.2-01 29-Mar-2020' ! Add the KEPLER_VELO variable

```

```

v_bundles = '1.2-02 13-May-2020' ! Add the KEPLER /RESET option
v_bundles = '1.3-01 22-May-2020' ! Add the UV_DETECT /COMPRESS command
v_bundles = '1.3-02 26-May-2020' ! Better UV_DETECT command
v_bundles = '1.3-03 30-May-2020' ! First correct UV_DETECT command
v_bundles = '1.3-04 10-Jun-2020' ! Handle KEPLER_X0 and KEPLER_Y0 properly
v_bundles = '1.3-05 09-Jun-2020' ! Re-size CONTINUUM data if needed in UV_RESTORE
v_bundles = '1.4-01 30-Jul-2020' ! /VDISK option for KEPLER
v_bundles = '1.4-02 01-Sep-2020' ! /VELOCITY option for KEPLER
v_bundles = '1.4-03 09-Sep-2020' ! /MASK option for KEPLER
v_bundles = '1.4-04 11-Sep-2020' ! /VDISK renamed to /VSYSTEM in KEPLER
v_bundles = '1.5-05 14-Dec-2020' ! SPECTRAL_CLEAN command
v_bundles = '1.5-06 14-Dec-2020' ! /HFS option to KEPLER SHOW
v_bundles = '1.6-00 28-Oct-2021' ! Move command EXPLORE to DISPLAY\ Language
v_bundles = '1.6-01 18-Nov-2021' ! Finish moving command EXPLORE to DISPLAY\ Language
v_bundles = '1.6-02 29-Sep-2022' ! /WIDGET option to KEPLER
v_bundles = '1.6-03 17-Feb-2023' ! COMBINE now support automatic spatial and spectral resamp
v_bundles = '1.6-04 25-Jun-2023' ! COMBINE /RELATIVE to ignore absolute position
v_bundles = '1.6-05 11-Jul-2023' ! COMBINE bug correction when spectral resampling
v_bundles = '1.6-06 24-Jul-2023' ! SELFCAL supports Mosaic
v_bundles = '1.6-07 31-Aug-2023' ! SELFCAL temporary file handling changes

```

2.6 IMAGER Language

```

character(len=20) :: v_imager      ! IMAGER
! IMAGER\ Language version v_imager
v_imager = '1.0-00 23-Mar-2022' ! First built-in release of IMAGER\ language
v_imager = '1.0-01 10-May-2022' ! Insert the PIPELINE command in stack
v_imager = '1.0-02 30-May-2022' ! Add the /PLOT option to SDI
v_imager = '1.1-00 17-Oct-2022' ! Move the POPUP command to DISPLAY\
v_imager = '1.1-01 02-Nov-2022' ! Add the /MODE option to PIPELINE
v_imager = '1.2-00 22-Jun-2023' ! Add the SIMULATE command
v_imager = '1.2-01 05-Jul-2023' ! SIMULATE FIDELITY and SHOW command
v_imager = '1.2-92 13-Jul-2023' ! PIPELINE EXPLORE action

```

2.7 SIMULATE Language

```

character(len=20) :: v_simu        ! SIMULATE
! SIMULATE\ Language version v_simu
v_simu = '1.0-02 07-Jul-2023' ! SIMULATE\ language - ADD_NOISE command
v_simu = '1.0-03 29-Aug-2023' ! Small bug correction in UV_TRACK initialization
v_simu = '1.0-04 14-Sep-2023' ! Bug in the NOISE handling

```