CORONAL DIAGNOSTIC SPECTROMETER

SoHO

CDS SOFTWARE NOTE No. 7

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CDS PLANNING TOOL USERS' GUIDE

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1 INTRODUCTION

The CDS version of the Science Planning Tool, MK_PLAN, is an IDL (Interactive Data Language) widget program that allows planning of CDS observations. CDS plans consist currently of two types: SCIENCE and DETAILS.

SCIENCE: describes general scientific objectives that are defined at science planning meetings.

DETAILS: describes specific CDS scientific studies that are performed to meet general scientific objectives.

MK_PLAN provides functions for browsing, creating, and editing the above plan types. These plan types are maintained in a UIT database system (CDS Software Note 10).

Although both types of plan can be created, the only type used in normal mode of operations is the DETAILS plan. The SCIENCE plans are updated after the DETAILS are created.

2 GETTING STARTED

MK_PLAN is started from the IDL prompt by typing, e.g.

```
IDL> mk_plan, [/reset]
```

When MK_PLAN is opened for the first time, the current date (starting at 00:00 UT) and a 24 hour display period is shown. Subsequent calls to MK_PLAN will use the most recent start date and attempt to restore the last saved configuration in memory. The /reset keyword is an optional keyword to reset memory. It is useful in case MK_PLAN crashes and needs to be restarted.

The first time MK_PLAN is started, the CDS-DETAILS widget interface shown in Figure 2 will be displayed. In addition, a timeline plot window will be displayed, showing one to several rows (Figure 1). The bottom row is the EDITING row, while the remaining rows are shown for reference and are not editable. The example in Figure 1 shows a timeline of DETAILS plans in the lower editing row, and a timeline of SCIENCE plans in the upper reference row. The appearance and combination of rows can be adjusted via the Customize Display Window option under the Operations button (Section 4.2), or by using the display buttons at the bottom of the widget interface. More information on each display button is given in Section 2.2. The current plan type that is being edited is displayed in the row marked STATUS as part of the label Editing TYPE Plan. You can switch to editing a different plan type by pressing the TYPE label button and selecting from the pull-down menu of plan types. Subsequent calls to MK_PLAN within the same IDL session will always restore the most recent customized settings. However, this button is very rarely used because the plan most often edited is the DETAILS plan.

2.1 Which Database?

The STATUS row also displays the current CDS database that is being accessed: OFFICIAL or PERSONAL. By default, MK_PLAN will access the database that is pointed to by the environment variable ZDBASE. The official database is protected and cannot be modified without special priviledge. The personal database is a copy of the official database that is located in a non-protected directory and can be modified freely. Provided you have sufficient disk space (about 32 Mb), you can make a personal copy of the CDS database (on a UNIX system) by the following steps:

```
>cp -rp /cds/data/plan/database  /path/db_name
>setenv,'ZDBASE_USER=+/path/db_name'
```

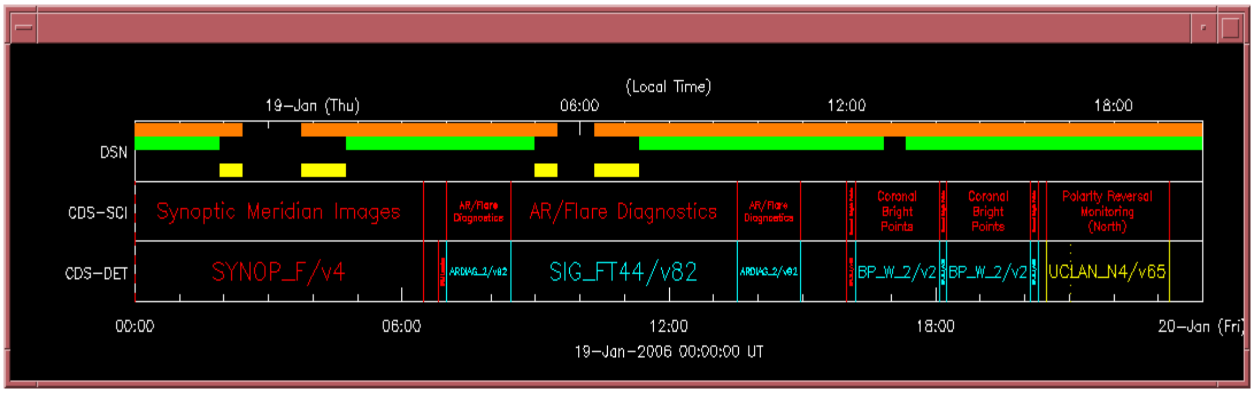


Figure 1: Timeline plot window showing CDS-DETAILS (editable) and CDS-SCIENCE(reference).

where the first copy command recursively copies all the relevant databases files and associated subdirectories from the official location (`/cds/data/plan/database` currently on `orpheus.nascom.nasa.gov`) to the top directory `/path_name/db_name` (e.g. `/usr/users/zarro/cds/my_cds_db`). The second command sets the environment variable `ZDBASE_USER` to the top directory of the personal database. If not already defined, then it is recommended to define the environment variable `ZDBASE_CDS` to point to the top directory of the official database. For example,

```
>setenv,'ZDBASE_CDS=+/cds/data/plan/database'
```

With the above environment variables defined, you can switch between the official and personal databases by pressing the pull-down button labelled: **Using `PERSONAL` Database**.

2.2 Changing The Display Interval

The start time of the timeline plot window is displayed in the text field `DISPLAY START` (Figure 2). The start time can be varied by editing the value in this field. The start time can also be varied in steps of an hour, week, or day by pressing the appropriate shift buttons from the pull-down menu under the `SHIFT` button, e.g. **<WEEK** to shift one week backward in time, or **DAY>** to shift one day forward in time, etc.

The duration of the timeline plot is displayed in the label button denoted by `DISPLAY DURATION`. This a pull-down button that allows you to vary the duration into 3, 6, or 12 hours units and also in units of 1 to 7 days.

3 CREATING CDS PLANS

3.1 Creating A `DETAILS` Plan Entry

Details plans consist of specific CDS studies that will be performed to fulfill the objectives defined in the `SCIENCE` plan. To create a `DETAILS` plan entry:

1. Ensure that the first status button shows that you are `Editing DETAILS Plan`. The widget interface will switch to the display shown in Figure 2. The bottom editable row of the timeline plot will refer to CDS-DETAILS plans.

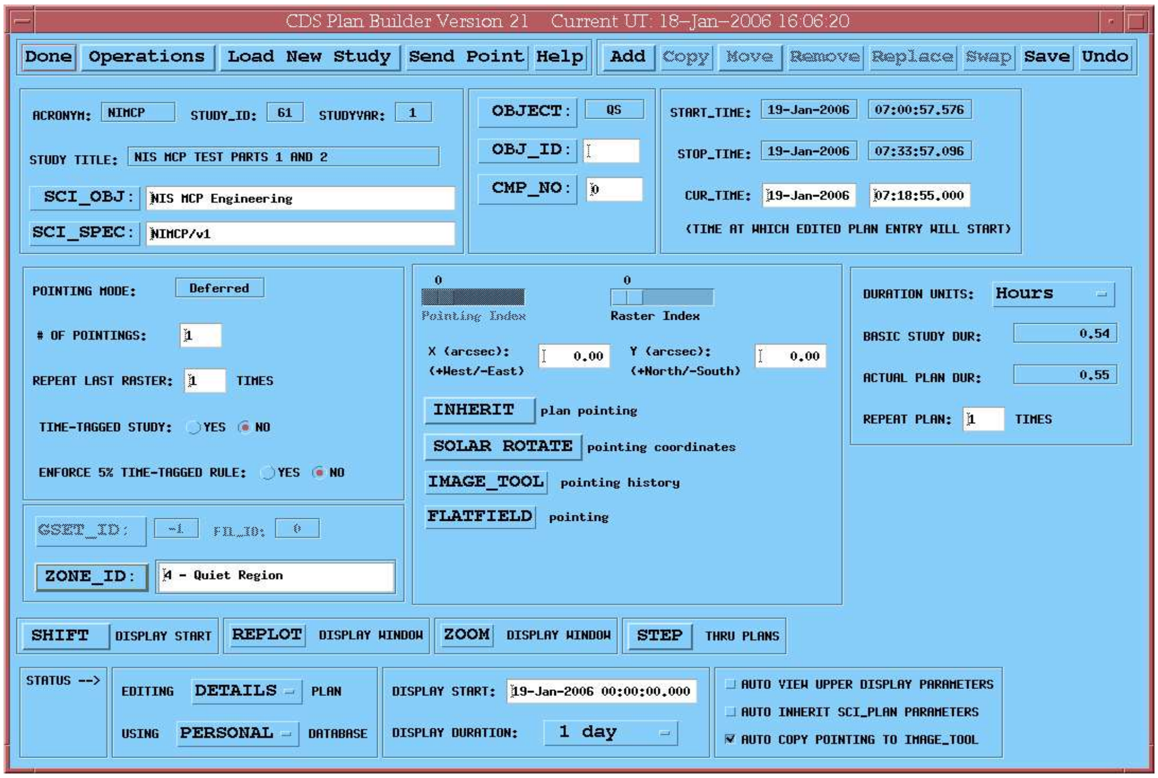


Figure 2: CDS-DETAILS widget interface

2. Press the `Load New Study` button to select a study from the database. Choose either to select a study from the database or from a list of bookmarks. When you choose to select from database, a widget interface (Figure 3) will appear. Choosing the study from the list of bookmarks will open a list of studies that are used on a regular basis (Figure 4). With either option, you should know the study acronym and then, you will be asked to select the study ID and a variation. Refer to CDS Software Note 2 for further details on the definition of a study. Refer to the CDS Planner Notes at http://solar.bnsc.rl.ac.uk/scientificops/thisweek.shtml for more information on studies and variations to run. Upon exiting this interface, the predefined parameters of the selected study will be loaded into memory and ready for scheduling. The selected study acronym, ID, and variation will be displayed in the text fields `ACRONYM`, `STUDY_ID` and `STUDYVAR`, respectively. The title of the selected study will appear in the text field `STUDY TITLE`. These fields are not editable.

3. Specify the start time of the study by moving the cursor in the bottom editing row to the desired start time and left clicking. A dotted vertical line will appear, and the corresponding time will appear in the text field `CUR_TIME`. You can also enter the time directly into the latter text field. *It is important that you do not click onto an existing plan entry; if you do, a pop-up will prompt you to either continue editing the current study or to move on to the one on which you have just clicked.*

4. Adjust the study duration. The base duration or exposure of a study is essentially fixed by the individual rasters that compose it. This base duration will appear in the text field `STUDY DUR`. The study duration can be extended in the following ways:

   - `REPEAT LAST RASTER`: The number of rasters in the study is shown in the text field `Raster Index`. This parameter is not editable. Adjusting the number in the text field `REPEAT LAST RASTER _ TIMES` and hitting enter will extend the study duration.
   - `# OF POINTINGS`: A second way to extend the study duration is to increase the number of repeat pointings of individual rasters. This option is only available if the pointing mode is not fixed; in

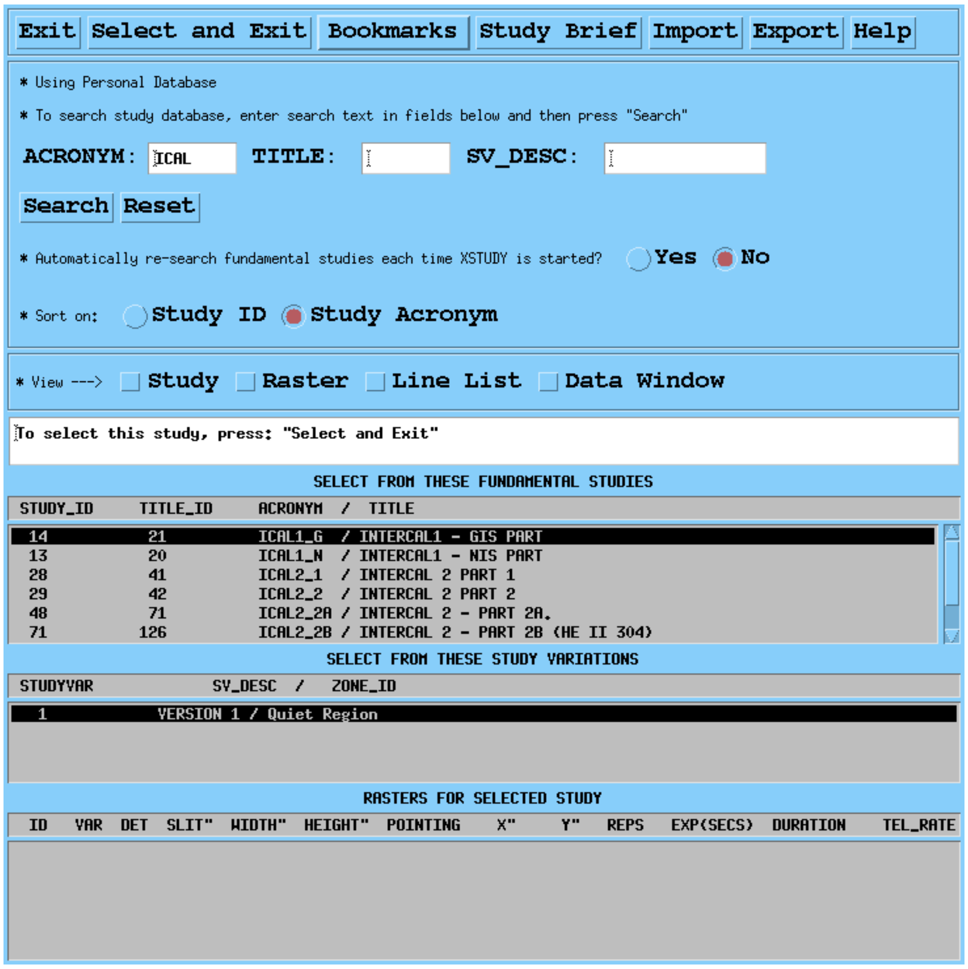


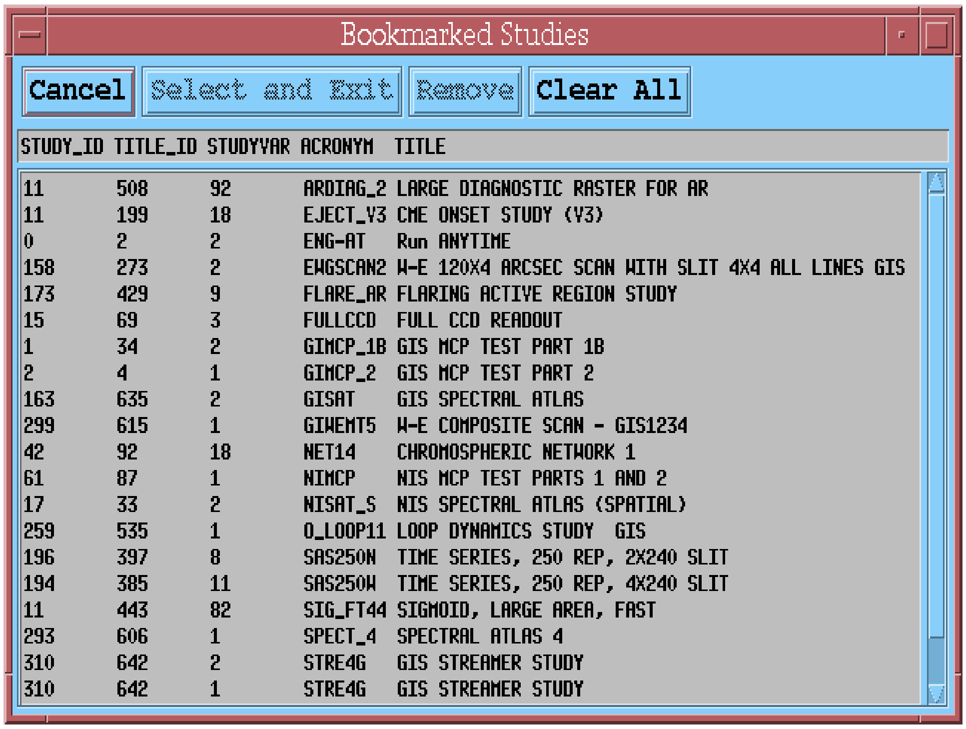
Figure 3: CDS Study Selector widget interface

the case of fixed pointing, the individual raster pointing coordinates have been specified already at the study definition level. The type of pointing for a study is displayed in the text field `POINTING MODE` and can be of type *Fixed*, *No Rasters*, or *Deferred*. You can adjust the number of repeat pointings in the text field `# OF POINTINGS`. In the *No Rasters* mode, the pointing can be `DEFERRED` or `INHERITED`. In `INHERITED` mode, the pointing cannot be adjusted, while in `DEFERRED` mode, it can. You can also specify the individual raster pointings in the text fields **X"** and **Y"**. Finally, you can browse the pointing coordinates by dragging the sliders labelled `Pointing Index`. The topic of CDS pointing will be discussed further in Section 5.

- `REPEAT PLAN`: A third and less often used method for extending the study duration is to repeat the study multiple times. The number of study repeats can be adjusted in the text field `REPEAT PLAN`. However, in some cases, `MK_PLAN` will tell you that the study can be extended by repeating the last raster; it is advantageous to extend the duration by increasing the number of rasters rather than repeating the study.

5. Fill in the following fields to further define the `DETAILS` plan (Figure 2):

   `SCI_OBJ`: A 50 character string describing the general scientific objective of the planned study. The science objective is described in the weekly CDS Planner's Notes, found online at http://solar.bnsc.rl.ac.uk/scientificops/thisweek.shtml *This field is mandatory.* Pressing this button will also produce a list widget of selectable predefined science objectives.



STUDY_ID	TITLE_ID	STUDYVAR	ACRONYM	TITLE
11	508	92	ARDIAG_2	LARGE DIAGNOSTIC RASTER FOR AR
11	199	18	EJECT_V3	CME ONSET STUDY (V3)
0	2	2	ENG-AT	Run ANYTIME
158	273	2	EWGSCAN2	W-E 120X4 ARCSEC SCAN WITH SLIT 4X4 ALL LINES GIS
173	429	9	FLARE_AR	FLARING ACTIVE REGION STUDY
15	69	3	FULLCCD	FULL CCD READOUT
1	34	2	GIMCP_1B	GIS MCP TEST PART 1B
2	4	1	GIMCP_2	GIS MCP TEST PART 2
163	635	2	GISAT	GIS SPECTRAL ATLAS
299	615	1	GIWEMT5	W-E COMPOSITE SCAN - GIS1234
42	92	18	NET14	CHROMOSPHERIC NETWORK 1
61	87	1	NIMCP	NIS MCP TEST PARTS 1 AND 2
17	33	2	NISAT_S	NIS SPECTRAL ATLAS (SPATIAL)
259	535	1	O_LOOP11	LOOP DYNAMICS STUDY GIS
196	397	8	SAS250N	TIME SERIES, 250 REP, 2X240 SLIT
194	385	11	SAS250W	TIME SERIES, 250 REP, 4X240 SLIT
11	443	82	SIG_FT44	SIGMOID, LARGE AREA, FAST
293	606	1	SPECT_4	SPECTRAL ATLAS 4
310	642	2	STRE4G	GIS STREAMER STUDY
310	642	1	STRE4G	GIS STREAMER STUDY

Figure 4: Bookmark list

`SCI_SPEC`: A 50 character string describing the specific scientific objective of the planned study. This field is optional. If it is not specified, then `MK_PLAN` will construct a specific objective by combining the study acronym with the study variation ID number, e.g. "`SYNOP_F/v2`". This field will be used to label the `DETAILS` entry in the timeline plot. Pressing this button will also produce a list widget of selectable predefined specific science objectives.

`OBJECT`: Clicking on `OBJECT` will produce a list of solar phenomena. Choose the object that best describes what you are observing. The initial value of this field is obtained from the selected study definitions.

`OBJ_ID`: `OBJ_ID` refers to the active region number or other referencing number associated with the area. If you reference an active region number, the format should be to enter the number with 5 digits, e.g. "10008", rather than "AR10008" or simply "0008".

`CMP_NO`: `MK_PLAN` will prompt you for the `CMP_NO`, and the field should be completed, especially if CDS is working jointly with TRACE or another instrument.

`GSET_ID`: For studies using the GIS detector, a `GSET_ID` must be chosen. In most cases, make sure `ZONE_ID` is correct and then choose the highest `GSET_ID` from the list that pops up. More information on which `GSET_ID` to use can be found in the Planner's Notes.

`ZONE_ID`: A pull-down menu of predefined descriptions for different observing targets (e.g. Coronal Hole Region). The initial value of this field is obtained from the selected study definition.

6. Press the `Add` button to add the new plan entry to the database. This button is a pull-down menu with two options:

   `Insert at Cursor Position (Time-Tagged)`: The study will be *time-tagged* to start at the time shown in the `CUR_TIME` field, i.e. the current cursor position. Studies that are *time-tagged* will be plotted in *red* in the timeline plot.

`Append To Last Entry Before Cursor Position (Not Time-Tagged):` The study will start when the last study before the current cursor position is completed. The study is classified as *non time-tagged* as its start time depends on the duration of the previous study. Studies that are not time-tagged will be plotted in *blue* in the timeline plot.

In the case where the new study is the first entry to be added during the displayed time interval the option to append will be replaced by:

`Insert at Start of Displayed Interval (Time-Tagged):` The study will be time-tagged to start at the beginning of the displayed interval (usually the start of the operational day). *The first study to start every operational day should be time-tagged.*

Once a new plan entry is added to the database, its final parameters will be reflected in the various widget fields. It is important to be aware of the following caveats when adding a new study:

- All time-tagged studies should follow the 5 % gap rule, i.e. a time-tagged study should be placed in the timeline so that any previous study has finished and there is a gap of 5 % of the duration of the previous study before the time-tagged study. `MK_PLAN` will prompt you if you attempt to place a time-tagged study too close to a previous study. You can override the 5 % gap rule, but it is not recommended.
- If you try to add a study between two time-tagged studies, you may get an error. It is strongly recommended that the time-tagged study be moved so that the new study can complete before the time-tagged study begins. If a study is inserted between two time-tagged studies and you do not get an error, the inserted study will be interrupted by the time-tagged study. In this case, the apparent duration appearing in the `PLAN_DUR` field will be *shorter* than the actual duration in `STUDY_DUR`.
- If you insert a new study between a time-tagged study and a non-time-tagged study, the subsequent study's start time will be delayed until the new study is completed. In this case, the value in the `START_TIME` field will differ from the original specified start time and correspond to the end time of the previous study.
- *QCM Rules*: QCM is a GIS engineering study that is run every day. It has pointing mode *No Rasters* and when placing it into the plan, a number of rules must be considered:
  (a) QCM must be time-tagged.
  (b) QCM must be run during NRT or the data will be lost.
  (c) QCM should not be run before other engineering studies (such as NIMCP, GIMCP, FULL-CCD).
  (d) QCM should not be the last study of the day or the pointing for the next day will be off.

3.2 Creating A `SCIENCE` Plan Entry- *It is no longer the normal mode of operations to create a* `SCIENCE` *plan before a* `DETAILS` *plan. This section still applies to creating a* `SCIENCE` *plan entry, but the* `SCIENCE` *plan is updated after the* `DETAILS` *plan is created.*

Science plans have a similar format for each of the SOHO instruments. Parameters that define individual science plans are outlined and fine-tuned at the monthly, weekly, and daily science meetings. To create a `SCIENCE` plan entry:

1. Press the `TYPE` button in `Editing TYPE Plan` and select `SCIENCE` from the pull-down menu. The bottom editable row of the timeline plot will refer to CDS-SCIENCE plans.

2. Specify a *start* time by moving the cursor in the bottom editing row to the desired time and clicking the *left* button. A dotted vertical line will appear, and the corresponding time will appear in the text field `CUR_TIME`. You can also enter the time directly into the latter text field. *It is important that you do not click onto an existing plan entry, otherwise the parameters defining the existing entry will be loaded into memory.*

3. Specify a *stop* time by moving the cursor in the bottom editing row to the desired time and clicking the *right* button. A dashed vertical line will appear, and the corresponding time will appear in the text field `STOP_TIME`. You can also enter the time directly into the latter text field. Additionally, you can specify the duration by entering it in the text field `PLAN DUR`. The stop time will be adjusted accordingly. The duration units will normally be displayed in seconds, however, these can units can be changed to minutes or hours by pressing the button `DURATION UNITS`.

4. Fill in the following text fields to further define the `SCIENCE` plan entry.

   `SCI_OBJ`: A 50 character string describing the general scientific objective of the planned entry. The science objective is defined at the science planning meetings. *This field is mandatory.* Pressing this button will produce a list widget of selectable predefined science objectives.

   `SCI_SPEC`: A 50 character string describing the specific scientific objective of the planned entry. Pressing this button will produce a list widget of selectable predefined specific science objectives.

   `DISTURBANCES`: A 50 character string describing any possible disturbances that could be caused by the observation.

   `NOTES`: A 50 character string describing special circumstances (e.g. studies or rasters) associated with the science entry.

   `XCEN`: Character string giving the approximate X coordinate (in arcsecs, + W) of the solar target associated with the science entry.

   `XCEN`: Character string giving the approximate Y coordinate (in arcsecs, + N) of the solar target associated with the science entry.

   `OBJECT`: A 3 character code name for the object to be observed, e.g. "EPR" for Eruptive Prominence. Pressing this button will produce a list widget of selectable predefined object names.

   `OBJ_ID`: A six character identification that further specifies the observation target, e.g., "`AR10713`" or "`S12W15`".

   `CMP_NO`: A unique identifier to associate separate observations that are part of the same observing campaign. Pressing this button will produce a list widget of selectable predefined campaign numbers.

5. Press the `Add` button to add the new plan entry to the database. This button is a pull-down menu with two options:

   `Insert at Cursor Position`: The entry will start at the time shown in the `CUR_TIME` field, e.g. the current cursor position.

   `Append To Last Entry Before Cursor Position`: The new entry will be appended to the last entry before the current cursor position.

   In the case where the new entry is the first entry to be added during the displayed time interval, the option to append will be replaced by:

   `Insert at Start of Displayed Interval`: The entry will start at the beginning of the displayed interval (usually the start of the operational day).

6. Other editing buttons for a `SCIENCE` plan can be found in Section 4.1.

4 EDITING CDS PLANS

4.1 Editing Buttons

Once a plan entry has been created and added to the database, it can be modified using a variety of editing functions. Recall that you can select the plan type to be edited by pressing the `Editing TYPE Plan` button in the STATUS row. To edit an existing plan entry, move and press the *left* cursor onto the entry in the editing row. The entry will become highlighted in *yellow* and its defining parameters will be loaded into the appropriate text widgets. Depending on the plan type, you can invoke the following functions:

`Copy:` Pressing this button will allow you to graphically copy a plan entry to a new location by a simple "drag and drop" operation, leaving the original entry in place. The highlighted plan will be surrounded by a flashing box cursor. While pressing the *left* cursor, drag the box cursor to the location in the timeline where you wish to make a new copy of the entry, then press the *right* cursor to perform the copy. Note that if the entry is copied onto an existing plan entry, then the latter entry will truncated in order for the copied entry to commence at the specified time. By definition, the new copied entry will be time-tagged to start at the specified time.

`Move:` This button is similar to `Copy` except that the original entry will be deleted. This is a pull-down button with the following options:

- `Move To New Cursor Position:` Move the entry to start at the time specified in the `CUR_TIME` field, i.e. the current cursor position. Before pressing this button, it is important to first highlight the entry in question and then move the cursor to the time position required.
- `Move Graphically:` Move the entry graphically to any time in the editing window by dragging the entry while pressing the *left* cursor and clicking the *right* cursor when the entry is in place.

`Remove:` Delete the currently highlighted plan entry from the database. If the deleted entry was followed by a non-time-tagged entry, then the non-time-tagged entry will be shifted automatically back in time to start after the last entry.

`Replace:` Replace defining parameters of the highlighted plan entry with new parameters. Here are some examples:

- To change any of the character text fields (such as `SCI_OBJ`), edit the field and then press `Replace`.
- To change a `DETAILS` entry from time-tagged to non-time-tagged, or vice-versa, press the button `TIME-TAGGED`, followed by `Replace`.

`Swap:` Switch the places of two existing plan entries.

`Undo:` Undo any of the above editing operations.

You cannot use `Replace` to change the plan start time. This operation can be performed only via the `Move` button. Note also that the start and stop times of the highlighted plan being edited will be displayed in the `START_TIME` and `STOP_TIME` fields, respectively. The `START_TIME` and `STOP_TIME` fields are not editable.

When making many edits in a plan, do not forget to `Save` periodically, so that your work is saved in the event that `MK_PLAN` crashes.

4.2 Operation Buttons

The `Operations` button provides additional editing tools via a pull-down menu with the following options:

`CHECK Raster Modes... :` This operation is not used by planners. `MK_PLAN` checks to make sure that raster modes are the same as the DSN Telemetry rates.

`CLONE Plan:` This operation is currently disabled.

`COPY Plan:` Copy a set of plans from a given day onto a series of new days. Although this feature is not often used, it is useful when constructing a set of plans for several days that are similar but may require minor modifications. *It is not recommended that the planner use this option.*

CUSTOMIZE Display Window: A pop-up appears in which you can change properties of the display window. You can choose to see the plans for other instruments, as well as DSN and Telemetry times.

DELETE Plan: Delete *all* entries in the editing timeline that start within the current display. This feature is useful when you wish to reconstruct plans for a day or several days. Entries that start before the current display period and extend into the display period will not be deleted.

HARD Copy Image Tool: A pop-up appears which allows you to send a copy of the image tool to the printer.

HARD Copy Timeline Window: A pop-up appears which allows you to send a copy of the timeline to the printer.

IMPORT Plans: This operation must be coordinated with the instrument engineer. This option allows plans to be emailed and imported into MK_PLAN so that planning can be done off-site.

LIST Currently Saved Plans: A pop-up appears which shows a list of all of the studies that have been planned in the details plan.

MK_STUDY: Often the list of available predefined studies in the database may not contain a study that is suitable for performing a specific observation. This button invokes the program MK_STUDY which is an IDL widget interface that allows you to create a new study and load it into the database. *This operation should only be used by experienced planners.*

MOVE Plan: A pop-up window appears which allows a planner to move a set of plans over a certain duration to another day or series of days. This operation should be used with caution as it can write over plans that may previously exist.

PRINT Highlighted Plan... : Prints a plan entry to file.

PRINT Plan Summary... : Prints a summary of plans for XCAT.

PRODUCE Study Briefing: Provides a short description of the study, if it is available.

REFRESH Display: As the name implies, this operation updates the display.

RESET Fields & REREAD Databases: Reset the widget fields and replot the timeline window. This feature is useful to undo edits that you have made but not yet implemented via the editing buttons.

UPDATE Science Plan... : Updates the Science Plan so that it coincides with the Details plan. This operation should be performed before running XCPT.

UPDATE_KAP: This operation updates the KAP file which gives MK_PLAN information on DSN. Although the KAP files update automatically, this operation can be used to update whenever new information is needed.

XCAMP: View, select, and update local campaign database.

XCAT: View FITS Catalog/Data from any date in CDS's lifetime.

XCPT: More detail on XCPT is given in Section 7 . When planning at Goddard, XCPT should be run after a plan is completed so that the instrument engineer can load the plan.

XDOC: Allows you to browse software for CDS.

XIAP: Write instrument activity plan (IAP). IAPs are written when XCPT is run, so this operation does not need to be performed if XCPT has been run on a plan.

XPORT: Writes the current plan to a text file which can be exported to Goddard.

5 ADJUSTING CDS POINTING

For studies that do not have *Fixed* or *No Raster/Inherited* pointing, the pointing can be adjusted to look at almost anything on the Sun. The steps for pointing CDS are as follows:

1. **Determine target.** The best way to decide which studies to run is to decide what feature on the Sun should be observed. A target may be provided or defined in the study or from another source (e.g. another instrument determines the target before a joint study is run). However, if the target is not already decided, the best way to look at the sun is through `Image_Tool`. At the current time, `Image_Tool` is only configured to run at the Goddard EOF and at RAL in the U.K. Other pointing options are discussed after the description of `Image_Tool`.

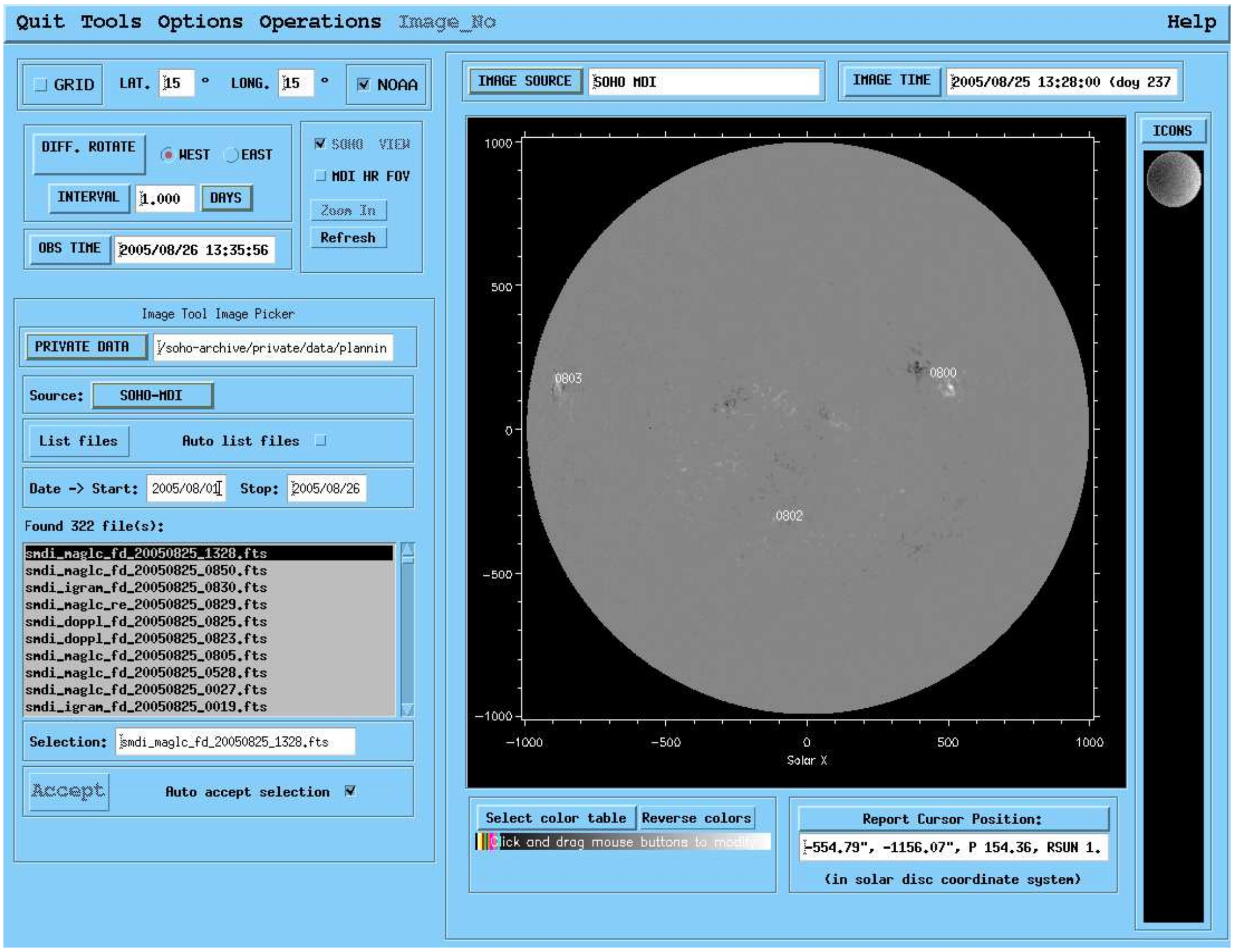


Figure 5: CDS Image Tool widget interface

- Click the `IMAGE_TOOL` button in the `MK_PLAN` window, and a new pop-up will appear with an image of the Sun on the right and pointing options on the left (Figure 5). To view the most recent image of the Sun, click on `Tools, Image Picker`. This will give you options for where to get data (`Personal`, `Synoptic`, `Summary`, or `Private` sources) and from which instruments you can view images. Type in the current dates and click `List Files`. Then, choose the image to view by clicking on the file. The image will appear in the right box and as an icon on the far right. The icons allow you to look at numerous images without having to use `Image Picker` each time. Clicking the boxed labeled NOAA will allow you to see the NOAA assigned sunspot numbers over the image you choose.

- Center EIT images on (0,0) solar x,y by using `Tools, Limb Fitter`. `Limb Fitter` allows you to pick a number of points to place on the limb of the EIT image. A closeup box on the left will show a zoomed in image so you can distinguish the limb easily. *Left* click to place a point on the limb until all points are placed. Then, click `Accept` and `Limb Fitter` will adjust the EIT image to center at 0,0.

2. **Point using** `Image_Tool`. Clicking on `Tools, Pointing Tool` will take you to the screen with an image on the right and options for pointing on the left. To point to a certain area

   - Click on a pointing index, click go and use the right mouse button to move the box that pops up over the image. The box will be the same relative size as the slit size that is inherent to the study being pointed.
   - Once you have covered the area that you wish to point to with the box, click ok and `Image_Tool` will record the solar x,y at the center of the box.
   - If you are satisfied with the pointing, click `Send to Planning Tool` and `Image_Tool` will copy the pointings to `MK_PLAN` .
   - If you want to repoint click `Undo` or `Undo All`.

   Below are descriptions of helpful buttons on the `Image_Tool, Tools, Pointing Tool` window:

   `Allow Time Projection:` If you want to point to a region in the future, the easiest way to determine where to point to observe the region once it has rotated is to check the Allow Time Projeciton box. `Image_Tool` will determine where the box must be to observe your currently pointed region in the future. The box must be checked before you point. Other ways of accounting for solar rotation are described later in this section.

   `Differential Rotate:` To get a more precise determination of where you should point, make sure that the Allow Time Projection box is unchecked and use the `Diff. Rotate` feature at the top of the `Image_Tool` widget. First, determine how long in the future from the time of the image (image time is listed above the image) you want to observe an area. Place this time into the `Interval` box. Then, use a *left* click to place a point or a box around the desired area. Then, click `Diff. Rotate` and choose whether to rotate the point or box. `Image_Tool` will rotate the point or box the given time into the future and plot a new point or box. From the new point or box, you can read the solar x,y coordinates (x,y coordinates listed under the image) and type those into the `Pointing Options` or into the planning tool.

   `Zoom In:` To view an area up close, click and drag the *left* mouse button to select the area and then *left* click the `Zoom In` button. When you want to see the full image again, click `Zoom In` again (this time it is labelled `Zoom Out`).

   `Refresh:` In most cases, when you select an area, place a point, or point to a region the white boxes and dots that are generated by `Image_Tool` stay on the image. If you want to remove these, click the `Refresh` button.

   `Plot:` The `Plot` button allows you to plot the areas that you have pointed or the rasters for the current pointing. This button is helpful in lining up a number of pointings for one study.

   `Select Color Table/Reverse Colors:` The `Select Color Table` button under the image allows you to choose which colors to view the image in; the `Reverse Color Table` button reverses the current colors. The color bar seen under these buttons adjusts the brightness of the image and can be very useful when distinuishing smaller features in the EIT or TRACE images.

   `Report Cursor Position:` This button allows you to change the units of the reported cursor position.

3. **Pointing without** `Image_Tool:` To point a study outside of `Image_Tool`, use the entry fields and buttons under the `Pointing Index` and `Raster Index` fields.

Type in Coordinates: You will see a box in which to enter an X value (in MK_PLAN , + X is West and − X is East) and a Y value (+ Y is North and − Y is South) in arcseconds. To enter a pointing in this way, just choose a study, clear the fields, type in the values, hit enter, and click `Replace`. This will apply those pointing coordinates to the study.

`Inherit:` You can choose to have the same pointing as a previous or suceeding study by using the `Inherit` button. When you click `Inherit`, you can choose whether you want to apply the same pointing to the new study as that of the previous or next study.

`Solar Rotate:` You can track a region over a number of studies by using the solar rotate feature. When clicking on `Solar Rotate`, you will see four options for rotating the pointing. You can rotate relative to the first pointing in the current study (only useful if the study has more than one pointing), relative to the last pointing of the previous study, relative to the same pointing index in the previous study (again, only useful if there is more than one pointing in your studies), or relative to the pointing of the selected plan entry (this only works if a different study from the on you're working on is highlighted).

`Image_Tool:` This button gives a list of the last ten pointings taken from `Image_Tool`.

`Flatfield:` This is an engineering option that is not useful for planners.

There are a number of ways to point studies in MK_PLAN , most of which revolve around use of `Image_Tool`. A more detailed description of `Image_Tool` is given in CDS Software Note 57.

6 PLANNER'S CHECKLIST

There are a number of things to remember when planning, so having a checklist of items to remember may be very useful. Here is a generic list:

1. Have I run the required engineering studies for today?
2. Have I run the correct science studies for today (participation in JOP or Campaigns, observing requests, etc.)?
3. Is my first study of the day time-tagged?
4. Did I follow QCM rules (QCM time-tagged, not followed by engineering studies, run during NRT, and not the final study of the day)?
5. Are all of my studies pointed on the correct area with solar rotation in mind?
6. Did I follow the individual study specifications found in the Planner's Notes?
7. Did I remember to fill in all fields such as `OBJ`, `ZONE_ID`, `OBJ_ID`, etc.?
8. Do all of my time-tagged studies follow the 5% rule?
9. Are all GIS studies time-tagged, with no more than 5 time-tagged studies in all? (This is lenient).
10. Did I save and `Run XCPT` or `XPORT`?

7 FINISHING UP

Now that your plan is completed, a number of things should be done.

1. `Save:` Click the `Save` button in the top left hand corner of MK_PLAN to save your current plans.

2. `Export:` If you are not planning from Goddard Space Flight Center, you will need to export your plans to CDS Ops so that they can be loaded to the instrument. Clicking on `XPORT` under the Operations pull-down menu will display a pop-up window in which you can choose the range of dates and location for your plans to be exported.

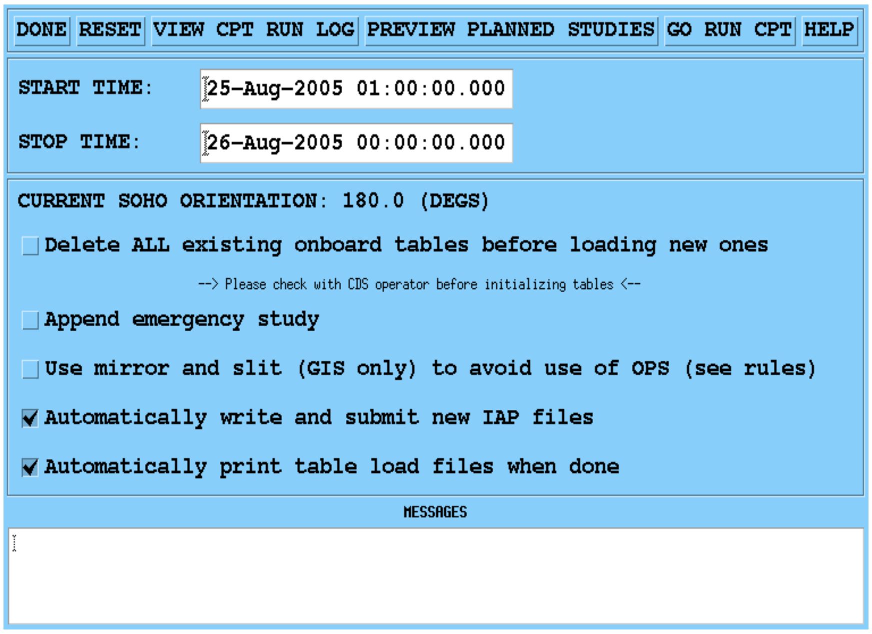


Figure 6: CDS XCPT widget

3. `Run XCPT:` If you are planning at Goddard, you should first check with the instrument engineer and then run `XCPT` on your current plans. `XCPT` prepares a set of plans so that they can be loaded to the instrument (Figure 6).

   - Click on `Operations` and then `XCPT - Run Command Preparation Tool`. A new window will pop up that recommends that you first update the `SCIENCE` plan. Click yes. After the `SCIENCE` plan updates, a new window will appear.
   - Type in the appropriate dates over which to prepare your plan. Unless the instrument engineer says otherwise, always check the boxes that say `Append emergency study`, `Automatically write and submit new IAP files`, and `Automatically print table load files when done`. Certain other cases will require additional boxes to be checked, but the instrument engineer will let the planner know about these cases.
   - Click `PREVIEW PLANNED STUDIES`. Make sure that all of the appended (non-time-tagged) studies have a $*$ next to them, and that the first study of the day does not have a $*$ next to it. Make sure all of the studies you want to run appear in the preview window.
   - Click `GO RUN CPT`. If `XCPT` runs correctly, you will be prompted to choose a printer in a few moments. If `XCPT` does not run correctly, don't panic, but notify the instrument engineer. You may be required to remove some of your studies or wait to run `XCPT` until later in the day.

4. **Exit:** You can exit `MK_PLAN` by clicking the `Done` button in the top left corner of the widget interface.