2 Setup, On-line help & useful routines

2.1 Setup

The CDS Quicklook software relies on a large number of routines in the CDS software tree, on environment variables pointing to data files, and on some IDL system variables to function correctly. For instructions on how to install the CDS software, we refer to CDS Software Note No. 17, *Installing the CDS software*.

The CDS software tree includes software for retrieving the telemetry, reading and writing to FITS files, display and analysis routines etc. For more details about the directory structure we refer to CDS Software Note No. 8, *Software and Data Directories* (Pike, 1993). Each directory which contains some files should have a `aaareadme.txt` file which explains the general purpose behind the files in that directory.

2.2 On-line help & useful routines

Each CDS routine contains a documentation header with information about the routine, the calling syntax, other routines being called and a modification history (see CDS Software Note No. 22 (Pike 1994). The header documentation should be informative enough to act as a reminder or to answer most general questions about the programs, and the header documentation is more likely to be up-to-date than software notes.

A set of routines has been designed to help give the user access to on-line help (see CDS Software Note No. 22 for more details). New users are recommended to play with these routines to get familiar with the CDS software and to search for useful programs.

`XDOC`
: A widget-based routine browser for X-windows users. The routine is used to display the documentation header as well as the source code if requested. Documentation from any routine found in !PATH can be displayed with XDOC.

`CHKARG`
: Returns the arguments of a named procedure.

`PURPOSE`
: Produce a list of the program names and the one-line entries after "PURPOSE" in the routine's documentation header.

`CHECK_CONFLICT`
: Check and report if there are any duplicate file names in the IDL search path.

`WHICH`
: Use to find where IDL finds a program file. This program is useful to check if you are running the version you really want.

`TFTD`
: Use to list a number of documentation one-liners or to search for a given text string in the names of available routines or in their one-line help.

SHOW_STRUCT
: provides an easy and quick graphical way to peruse all levels of a structure variable.

XPL_STRUCT
: is similar to SHOW_STRUCT, but when selecting an item from the pulldown menu showing the structure, it will call a help widget (WIDG_HELP) to display some information on the structure/tag chosen. For this to work, the structure must be described in the file struct_tags.hlp, which must be located in the IDL path.

We strongly recommend the use of XDOC to obtain information about the various routines in the CDS directory. The XDOC routine can also be useful to browse the CDS software tree and to search for useful programs.

Following are some examples of how to use some of the above routines.

The routine tftd is useful when you don't remember the exact name of a routine, but you can make an educated guess about a phrase that the name or purpose contains:

```
IDL> tftd,'dsp'          ; Let's say you're trying to locate a display routine

Thoughts for the day produced by TFTD q.v.

CDSPICKFILE       - This function allows the user to interactively pick a file
CWQ_DSPWAV        - Constitutes one column of the data display in DSPWAV.
DSPEXP            - Display all exposures of selected Spectral Windows.
DSPSPEC()         - Displays all Spectral Windows from specific exposures.
DSPWAV            - Display data slices at specific wavelength +line profiles
DSP_AUX           - Plot/display auxiliary data from a qlds.
DSP_INFO          - Display basic information from a CDS QL Data Structure
DSP_MENU          - Selection of display modes for CDS QL data.
DSP_MOVIE         - Display a movie of CDS "slit spectrograms" (SCANX/Y/T)
DSP_POINT         - Show pointing area for QLDS with IMAGE_TOOL
DSP_RASTER        - Displays locations of CDS raster using IMAGE_TOOL.
DSP_STRARR        - To display a string array in a text widget.
DSP_STRUCT        - Display contents of a structure as a pulldown menu.
DSP_WAV           - Show images at given wavelengths + spectra at given point
GDSPSPEC          - Displays all spectral windows from specific exposures.
NDSPSPEC()        - Displays all Spectral Windows from specific exposures.
```

The routine **chkarg** is useful if you know the name of a routine but can't remember whether it's a function or procedure or want a quick route to checking its parameters and keywords:

```
IDL> chkarg,'dsp_point
---- Module: dsp_point.pro
---- From:   /mn/achernar/u2/cds/fcs
---> Call: PRO dsp_point,qlds,modal=modal,group=group,xix=xix,yix=yix,$
accumulate=accumulate,fov=fov,point_stc=point_stc,$
no_rotation=no_rotation,soho_view=soho_view,unfold=unfold
```

For users who are intending to create new procedures or functions and wish to avoid creating program names which duplicate an existing one, which provides a quick and easy check for existing names. It also provides you with information about which copy IDL actually was using, your own *modified* version or the *old* version in the CDS library.

```
IDL> which, 'purpose'       ; Determine which routine IDL is picking up

/cds/util/help/purpose.pro  ; Resulting output
```

We should also mention a general software package called the SERTS Image Display Routines and the SERTS Graphics Device Routines. The software is described in CDS Software Notes No. 5 and 6 (Thompson 1993b, 1993c). A few examples of this software will be given in Section 5.6.

3 The CDS Instrument

The Coronal Diagnostic Spectrometer (CDS) consists of a Wolter-Schwartschild II grazing incidence telescope which has the focus at a slit assembly which lies beyond a flat scan mirror. After the slit, two components of the beam are fed into two spectrometers. One component feeds a normal incidence spectrometer (NIS) with a twin toroidal grating assembly and a 2-D detector. Another part of the beam is fed to a grazing incidence spectrometer (GIS) with a spherical grating and an array of four 1-D detectors along the Rowland Circle.

The NIS detector consists of 1024×1024 pixels. Two spectra are imaged onto the CCD, offset on either side of the horizontal center-line as shown in Figure 1. The spectral coverage is approximately 310–380 Å and 517–633 Å The longest slits are 240 arcseconds in length which, at a plate scale of 12.5 micron/arcsec, translates to 3 mm on the detector. Thus, only the central 1024×256 pixel area (approximately) is used. The horizontal direction is the direction of spectral dispersion while the vertical direction is the spatial dimension along the slit.

In practice, it will be rare that CDS can return the full NIS detector output due to the limited telemetry rates available. In most cases a selection of data will be used, to limit the telemetry requirements, where a set of detector data windows, or line windows (since the windows are usually centered around emission lines) will be extracted from the full detector. An example of a typical line selection is shown in Figure 2 where 12 windows have been selected.

The GIS spectrum is focused into four 1-D detectors and cover the wavelength ranges 155-244 Å, 261–346 Å, 395–496 Å, and 662–787 Å. Figure 3 gives an example of a synthetic GIS spectrum As for the NIS detector a selection of line windows can be extracted from the four GIS detectors. A summary of line lists to be used during different observing sequences can be found in the CDS Blue Book.