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SOHO

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Processing CDS Level-0 CDROMs

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1 Overview

The final distribution of the CDS level-0 telemetry data is delivered on CDROMs. The final FITS files of the scientific data are then generated from these CDROMs. However, the process is not trivial, and requires some explanation.

The CDS science stream is broken up into three separate application identifications (APID), depending on the rate that the data is transmitted. These APIDs are

APID (hex)	CDROM directory	Description
88A3	g026	CDS low rate
88A5	g027	CDS medium rate
88A6	g028	CDS high rate

(There is a separate APID for CDS housekeeping data, which doesn't concern us here.) Normally, CDS science telemetry is sent at the medium rate. This corresponds to telemetry submode 1, which is the normal mode. Other modes, 2–4, correspond to cases where CDS either gives up some of its telemetry allocation to other instruments, or other instruments give up some of their allocation to CDS. On the CDROM, each telemetry submode is in a different directory. For example, the medium rate telemetry might be in the directory

/cdrom/data/so/g027/lz

while the high rate telemetry is in the directory

/cdrom/data/so/g028/lz

In order to actually process these data, the packets for each day must be sorted back together into time order, removing the distinction between the three CDS science APIDs. This is done by a program called LOAD_CDROM.

There is an additional complication when processing CDROMs—the data are not sent in strictly time order. For example, CDROM #8 contains data from February 1st, 3rd and 4th of 1996, while the data for the 2nd is on CDROM #11. Also, there will occasionally be instances when a date will appear on more than one CDROMs. In those cases, the data on the later CDROMs supercede those on the previous CDROMs.

2 The CDROM numbering scheme

There are two numbers associated with each CDROM which together uniquely identify it. These are:

SEQUENCE: The sequence number of the CDROM. For example, a CDROM might have the label on it

SO_CDS_LZ_0002

The sequence number of that CDROM is therefore 2.

VOLUME: A CDROM sequence may be further divided into one or more volumes. For example, if the label of the CDROM in the previous example went on to say

4 of 9

then its volume number is 4.

3 Mounting CDROMs

3.1 At the SOHO EOF

The commands to mount and dismount a CDROM on one of the CDS workstations in the SOHO EOF at Goddard are now simply "cd-mount" and "cd-umount". It is not necessary to be logged into the root account. Level-0 telemetry CDROMs must be mounted and processed on cds9.

3.2 At other sites

At other sites, the "cd-mount" and "cd-umount" utilities may not be available. In that case it is necessary to be logged into the root (superuser) account.

To mount a CDROM from the root account, use the following command:

```
mount -t cdfs /dev/rz4c /cdrom
```

Optionally, you can use the "-o noversion" modifier to make the disk look more Unix-like, e.g.

```
mount -t cdfs -o noversion /dev/rz4c /cdrom
```

The difference is in whether the filenames are rendered in upper- or lower-case, and whether or not a VMS-like ";1" is appended to the name. However, the software discussed below should work regardless of whether or not the "-o noversion" modifier is used.

To dismount the CDROM, use the command

```
umount /cdrom
```

4 Starting up XCDROM

All of the CDROM processing functions are controlled from a single IDL widget-based application called XCDROM. Simply type

```
IDL> xcdrom
```

This will bring up a widget menu, as shown in Figure 1.

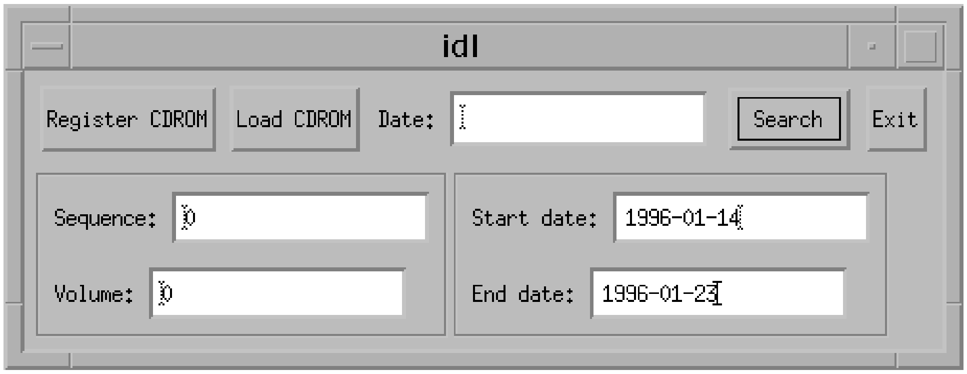

Figure 1: The XCDROM widget program.

5 Registering CDROMs

When new CDROMs arrive, they must be cataloged. The catalog lists which dates are stored on each CDROM. From the XCDROM program, you can register a CDROM simply by clicking on the `Register CDROM` button. When you do so, information about the currently mounted CDROM appears both within the widget fields, and in the terminal window that XCDROM was run from. Multiple CDROMs can be processed in a single IDL session by mounting and unmounting them from a separate terminal window, and pressing the `Register CDROM` button each time.

6 Searching the CDROM catalog

One can search the CDROM catalog in one of two ways.

By sequence/volume: To ask which dates are stored on a given CDROM, simply enter the sequence number and volume number in the appropriate boxes, and select `Search on sequence/volume` from the pull-down menu. A list of which dates are on the CDROM will appear in the terminal window that XCDROM was run from. Also, the first and last dates will appear in the widget boxes.

By date: To ask which CDROMs cover a certain time period, fill in the dates in the start and end date boxes, using the format *year-month-day*, e.g. "1995-12-14", and select `Search by date` from the pull-down menu. The information will appear in the terminal window.

7 Deciding which CDROMs to load

There is a notebook in the EOF which is used to record what CDROM data has been processed. First check the notebook to see what was the last full CDROM which has been processed. For example, if the last CDROM which was processed was sequence #2, volume 3 of 9, then use the XCDROM program to determine which dates are covered by seq. #2, vol. 4 of 9. You'll get a list like the following

```
Sequence Volume    Date

     2        4   1995-12-14
     2        4   1995-12-16
     2        4   1995-12-17
     2        4   1995-12-18
     2        4   1995-12-19
```

If you then ask XCDROM to display which CDROMs cover this date range (the values will already have been entered for you), then you'll get a list such as

```
Sequence Volume    Date

     2        4   1995-12-14
     2        4   1995-12-16
     2        4   1995-12-17
     2        4   1995-12-18
     2        4   1995-12-19
     2        5   1995-12-15
```

Thus, you'll need to load all of CDROM #2, 4 of 9, and the single date 1995-12-15 from CDROM #2, 5 of 9.

Because sometimes data for a given date is sent more than once, one should never process the last few CDROMs which have arrived. (However, they should always be registered immediately.)

If there is a day missing from the CDROMs which have arrived so far, then processing should be suspended until the data for the missing day arrives.

Always write in the notebook which CDROMs and dates were loaded.

8 Loading CDROM data

The process of loading a CDROM involves reading all the telemetry data files and writing them out again into the directory $CDS_CDROM_DATA. The output files have the same naming convention and format as those collected during the realtime pass. It takes about 10 minutes of processing for each day's worth of telemetry to do this conversion. On a heavily loaded system, it could take longer.

One can either load an entire CDROM, or select out a particular date. To load an entire CDROM, leave the `Date` field blank, and press the `Load CDROM` button. To load a single day, enter the date into the `Date` field before selecting `Load CDROM`.

Always load the CDROMs in order. If the search procedure says that you must load all of one CDROM, and part of the next, then load them in that order. That way, if a day shows up twice, the later version will override the previous.

9 Processing CDROM data

After loading the CDROMs, use the FITSGEN program to process them. Use the following procedure:

1. Select `Replay` mode.
2. Press the `Select TM file` button, and select `CDROM Data`.
3. Select the first "tm." file in the list, and press `Done`.
4. Select `Unlimited Run`
5. Enter in the study ID number and the raster index of the next FITS file to be generated from the CDROMs. For example, if the last FITS file generated was s107r03.fits, then enter 107 for `Start study` and 4 for `Start index`. (It doesn't matter if there is no such observation.) Leave the end study and index at their default values, 0 and -1 respectively.
6. Make sure that the box labeled `Processing final distribution (CDROMs)` is selected. This is *very important*.
7. Press the `Start` button.

There are a few differences in how the CDROMs are processed as compared to how the realtime and quicklook telemetry is treated. First of all, when processing the CDROMs, FITSGEN will not write out a FITS file if the end of telemetry is reached before the end of the raster. Thus, at the end of the run, you may see a statement such as

```
1996/04/22 08:39:40.328 (packet 6404):
Read raster header for Study: 673, Raster: 0
```

without any corresponding statement about writing the FITS file. Also, at the end of the run, FITSGEN will reprocess the telemetry to generate a mechanism movement log, and a relays log. (See CDS software note #31.) This will take several hours in addition to the time needed to generate the FITS files.

When FITSGEN finishes creating FITS files, note down in the logbook the name of the last FITS file that was created, together with the packet time of its raster header. (Don't confuse this with the packet time of the last raster header that was read in, which may not have generated a FITS file.)

10 Unloading CDROM data

When FITSGEN reaches the end of its run, including the mechanism and relays processing, then the telemetry files need to be cleared out of the $CDS_CDROM_DATA directory to make way for the next set of CDROMs. However, some data needs to be left to provide continuity. This is controlled by the program UNLOAD_CDROM. It's argument is the packet time of the raster header for the last FITS file generated, e.g.

IDL> unload_cdrom, '1996/04/22 08:19:55.629'