CORONAL DIAGNOSTIC SPECTROMETER
SOHO

CDS SOFTWARE NOTE No. 17

Version 3 30 November 1995

INSTALLING THE CDS SOFTWARE

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1 Introduction

This guide is intended to explain how to install the CDS operations and science analysis software. It is divided into two sections. The first section describes how to copy over the software to your local computer. The second section explains how to configure the software.

The assumption is made in this document that you are installing the software on a Unix computer. However, the CDS software is designed to also operate on the VMS or OpenVMS operating system. If you wish to use the software on a VMS computer, you have several options, the simplest of which is to install the software on a local Unix computer and then NFS mount it onto the VMS machine.

2 Copying the software

The CDS software tree is available via anonymous ftp from the Universal Resource Locator (URL)

```
ftp://sohoftp.nascom.nasa.gov/pub/softops/cds
```

For those who are unfamiliar with URLs, this means that you ftp to sohoftp.nascom.nasa.gov, log in as anonymous, and enter your Email address for the password. The CDS software is then found in the subdirectory pub/softops/cds. For example:

```
> ftp sohoftp.nascom.nasa.gov
Name: anonymous
Password: myname@mycomputer.domain    <not echoed>
ftp> cd pub/softops/cds
ftp>
```

The software is also available via the World Wide Web at URL

```
http://sohowww.nascom.nasa.gov/softops/cds
```

It is anticipated that this software will also be available from several European sites.

There are two ways you can copy over the CDS software and associated data files. You can either use the Perl MIRROR program (recommended) or copy over tar files and extract the software from those files.

In either case, you must first pick a directory which will serve as the top of the CDS tree. It is customary, but not necessary, to create the logical link `/cs` (for CDS software) to point to this directory. For example,

```
mkdir /usr/local/cs
ln -s /usr/local/cs /cs
```

Note that only the root user would have permission to create the logical link `/cs`.

At this point, you are presented with two options: to use MIRROR or tar.

2.1 Using MIRROR

MIRROR is a package written in Perl that uses the ftp protocol to duplicate a directory hierarchy between the machine it is run on and a remote host. It avoids copying files unnecessarily by comparing the file time-stamps and sizes before transferring. Amongst other things, it can optionally compress, gzip, and split files. It was written for use by archive maintainers but can be used by anyone wanting to transfer a lot of files via ftp. Regardless of how it is called, MIRROR always performs the same basic steps. It connects to the remote site, internally builds a directory listing of the local target directory, builds one for the remote directory, compares them, creates any subdirectories required, transfers the appropriate files (setting their time-stamps to match those on the remote site), creates any symbolic links, removes any unnecessary objects and finally drops the connection.

The advantage of using MIRROR is that only the files that changed since the last time mirror was used are copied over. This allows you to run MIRROR automatically through a cron job, without excessive use of the network. An exact copy of the selected directory tree is maintained on your system.

In order to use MIRROR, you must first have Perl installed on your computer. Information on downloading the current Perl source code can be obtained from

```
http://www.perl.com/perl/faq/
```

The code will have to be compiled on the local system that will be used to run MIRROR. The current MIRROR Perl script can be downloaded from

```
http://src.doc.ic.ac.uk/packages/mirror/
```

Detailed installation instructions for Mirror and Perl can be found at the corresponding URL addresses.

At the time of writing, MIRROR does not appear to work reliably under Perl version 5. Therefore, we recommend that you install version 4 of Perl instead. If you continue to have problems, you may try installing a set of perl libraries that we use. These are in the file `mirrorlib.tar.Z` in the CDS software tree. Simply set the environment variable PERLLIB to point to this directory tree before running Perl.

The following is a MIRROR input script, known as a "package", that guides the program through the steps of logging remotely into the SOHO anonymous ftp server and mirroring files from the server to the local /cs directory.

```
package=cds_software
        comment=CDS Software Tree
        remote_user=anonymous
        remote_password=<your-email-address-here>
        site=sohoftp.nascom.nasa.gov
        remote_dir=/pub/softops/cds
        local_dir=/cs
        exclude_patt=\.tar
```

Such a package would mirror the entire CDS software tree (except for tar files). You may wish to mirror only certain subdirectories, in which case you would have a package file that contained several packages, one for each directory.

To run this package, you would use a command like

`mirror` *filename*

If you wish to run this automatically, you would need to create an shell script such as the following

```
#!/bin/csh
/usr/local/bin/mirror /usr/local/mirror/packages/cds
exit
```

(This may vary depending on how MIRROR is installed on your system.) This file would need execute privilege (e.g. "chmod +x update_cds"). Then, you can use the command "crontab -e" to enter a line like the following into your cron table:

```
0 3 * * * /usr/local/mirror/scripts/update_cds
```

In the above example, MIRROR is run automatically via cron once a day at 3 A.M.

MIRROR has various features, options, and keywords that are too numerous to summarise in this document. Further information can be obtained from the author Lee McLoughlin (lmjm@doc.ic.ac.uk).

2.2 Using compressed tar files

If you are unable to use MIRROR to copy the software, there are also compressed tar files which are available via anonymous ftp. The following example shows the steps needed to copy over the entire CDS tree via ftp.

```
> mkdir /usr/local/cs
> ln -s /usr/local/cs /cs
> cd /usr/local
> ftp sohoftp.nascom.nasa.gov
Name: anonymous
Password: myname@mycomputer.domain    <not echoed>
ftp> cd pub/softops/cds
ftp> binary
ftp> mget *.tar.Z
ftp> quit
> uncompress cds_soft.tar.Z
> uncompress cds_data.tar.Z
> uncompress cds_lrg_data.tar.Z
>tar -xspf cds_soft.tar
>tar -xspf cds_data.tar
>tar -xspf cds_lrg_data.tar
>rm cds_soft.tar cds_data.tar cds_lrg_data.tar
```

Note that, in order for tar to work correctly, there must be a subdirectory called cs below the current directory. Otherwise, the tar procedure will create it.

3 Categories of user

The CDS software relies on a number of environment variable definitions in order to read and write various forms of data. This document describes the variables that must be defined to allow different categories of user access to the data they might require.

The software refers to each environment variable in either a read or write mode. Users may define the "write" version of these variables, but if they do so they **MUST** point to **PRIVATE** directories. The MASTER user (see below) is the only one who will have the write environment variables pointing to the official directories. In execution, if the software requires a write environment variable, and that variable is not defined, it will either skip the code that writes out data or, if appropriate, write to the user's home or current directory.

The categories of user considered are:

MASTER: This is the user who:

- controls update access to all project databases
- performs the 'official' command preparation
- runs any command Perl scripts
- runs the EGSE telemetry receipt software
- runs the version of STM which writes auxiliary data
- runs FITSGEN to create the level-1 FITS files
- runs any engineering monitor processes to create the official mechanism history logs

LOW-LEVEL-USER: This is most likely a CDS project member, but could be a knowledgeable general user who requires low-level access to the system, but who is not responsible for the daily operations. They might:

- run the planning tools, including CPT, to assess the feasibility of an observation. Any output would be directed to private directories.
- run STM, in replay or realtime mode, to monitor the science telemetry, but not to create any official auxiliary data
- run FITSGEN for test purposes, but sending the output to a private or scratch area
- access the engineering monitor data for analysis
- read the science data (FITS files)

GENERAL-SCIENCE-USER: This user will be interested in:

- basic planning to the Study stage
- analysis of the FITS data

Clearly any user may at one time or other fall into either of the last two categories.

4 Setups required

For each of the categories of user we give below a list of the essential environment variables and of definitions they may require for special purposes.

4.1 MASTER

The CDS master user requires *all* the environment variables of the low-level user (Section 4.2), and of the general science user (Section 4.3), plus the following:

4.1.1 General

ZDBASE_USER: Must point to the same directories as the environment variable ZDBASE_CDS.

CDS_INFO_W: The top level CDS information directory. Needs write access to update the save files used in the on-line help utilities.

4.1.2 Science planning

CDS_IAP_W: Write access is required to the directory containing the official CDS Instrument Activity Plan.

4.1.3 FITS generation

CDS_OPERATOR: Defined as the e-mail address of the person to receive error messages from FITSGEN.

CDS_CP_MISC_W: Write access to files used jointly with CPT.

CDS_TM_LOG_W Write access to directory containing log files generated by FITSGEN.

CDS_FITS_DATA_W Write access for the FITS files produced by FITSGEN.

CDS_FITS_QLI_W: Write access for the quick-look image FITS files produced by FITSGEN.

4.1.4 Command Preparation

CDS_CP_UPDATE:

CDS_CP_UPDATE_W:

CDS_CP_LTBFILES:

CDS_CP_LTBFILES_W:

CDS_CP_CVTFILES:

CDS_CP_CVTFILES_W:

CDS_CP_TTCFILES:

CDS_CP_TTCFILES_W: Read and write access to output files from CPT.

4.1.5 Uplink confirmation

CDS_CP_STMFILES_W:

CDS_CP_STMFILES: MASTER requires write access to output files from the uplink Perl scripts. Since these files are only connected with realtime commanding, only MASTER should have this definition. The files created are used to compare with the table dumps seen by STM, but the comparison is ONLY done if the CDS_CP_STMFILES_W variable is set. It is therefore restricted to the version of STM run by the MASTER account.

4.1.6 Science telemetry monitor

CDS_STM_DUMP_W: Write access to the directory containing the auxiliary data written by STM.

CDS_GIS_RAW_W: Write access to the raw GIS data dumps.

CDS_MEM_DUMP_W: Write access to the CDHS memory dumps.

4.1.7 Engineering telemetry monitor

CDS_ENG_DATA_W: Write access to the relay history data.

4.2 LOW-LEVEL USER

A CDS "low-level" user might require both read and write access to the data directories, although in this case any write access must be to private directories. This type of user might also want to be able to switch the read environment variables between the official directories (eg to see what is currently in the official operations plan) and their own directories (to see the results of their experimental planning, say). Therefore, this category of user would require *all* the environment variables of a general scientific user (Section 4.3), plus the following:

4.2.1 Science planning

If the user wishes to experiment with the science planning software, then the following environment variable can be defined:

CDS_IAP_W: Write access might be required to a *private directory* when experimenting with writing IAP files from the planning software.

4.2.2 FITS generation

If the user wishes to experiment with the FITSGEN program, then he/she may wish to define the following environment variables:

CDS_TM_LOG_W: (Optional.) Write access to a personal FITS log file directory. If not defined, then log files are written to the current directory.

CDS_FITS_DATA_W: (Optional.) Write access for personal FITS files produced. If not defined, the FITS files are written to the current directory.

CDS_FITS_QLI_W: (Optional.) Write access for the personal quick-look image FITS files produced. If not defined, the FITS files are written to the current directory.

4.2.3 Command Preparation

CDS_CP_UPDATE:

CDS_CP_UPDATE_W:

CDS_CP_LTBFILES:

CDS_CP_LTBFILES_W:

CDS_CP_CVTFILES:

CDS_CP_CVTFILES_W:

CDS_CP_TTCFILES:

CDS_CP_TTCFILES_W: Read and write access in a personal directory for output files from CPT.

4.2.4 Science telemetry monitor

CDS_STM_DUMP: read access to official or personal STM data

CDS_STM_DUMP_W: write access to create personal auxiliary STM data

CDS_TM_DATA: read access to the telemetry data files

CDS_GIS_RAW: read access to personal or official raw GIS data

CDS_GIS_RAW_W: write access to personal raw GIS data dumps

CDS_MEM_DUMP: read access to personal or official CDHS memory dumps

CDS_MEM_DUMP_W: write access to personal CDHS memory dumps

4.2.5 Engineering telemetry monitor

CDS_TM_RELAYS: read access to personal or official relay history data

CDS_TM_RELAYS_W: write access to personal relay history data

4.3 GENERAL SCIENTIFIC USER

All users, including the master and low-level users, would have these environment variables set.

4.3.1 General

ZDBASE_CDS: Points to the directories or directory tree containing the official project databases.

ZDBASE_USER: Defined as any combination of personal and official databases

PSLASER: (Optional.) The local Postscript printer. Not required if the default printer is a PostScript printer.

PSCOLOR: The local colour Postscript printer.

CDS_INFO_NOTE: The directory where the CDS software notes are kept.

CDS_INFO: Contains information used by routines such as TFTD.

SYNOP_DATA: Points to a directory tree of synoptic solar images used by IMAGE_TOOL.

TIME_CONV: Location of the leap seconds data file for time conversions. On some systems, may also point to a file containing information needed to convert between local and UTC time.

ANCIL_DATA: Points to directory tree containing SOHO ancillary data, such as orbit and attitude files.

CDS_EXTERNAL: The name of the shareable object file used by several IDL procedures via CALL_EXTERNAL. The use of this feature speeds up several of the routines.

4.3.2 Science and technical planning

CDS_IAP: Read access to the directory containing the official CDS Instrument Activity Plan files.

SOHO_EAP: Read access to the directory containing the SOHO-wide ECS Activity Plan files.

CDS_PLAN_TECH: Read access to several auxiliary planning data files.

4.3.3 FITS generation

CDS_TM_LOG: Read access to the official FITS log files.

CDS_TM_DATA: Read access to the telemetry files.

CDS_FITS_DATA: Read access for FITS files.

CDS_FITS_QLI: Read access for the quick-look image FITS files.

4.3.4 Command Preparation

CDS_CP_UPDATE:

CDS_CP_LTBFILES:

CDS_CP_CVTFILES:

CDS_CP_TTCFILES: Read access to output files from CPT.

4.3.5 Science telemetry monitor

CDS_STM_DUMP: Read access to official or personal STM data.

CDS_TM_DATA: Read access to the telemetry data files.

CDS_GIS_RAW: Read access to raw GIS data.

CDS_MEM_DUMP: Read access to CDHS memory dumps.

4.4 Engineering telemetry monitory

4.4.1 Engineering telemetry monitor

CDS_TM_RELAYS: Read access to relay history data.

4.5 Calibration

CDS_VDS_CAL_INT Data used to calibrate the NIS/VDS detector.

4.5.1 Science analysis

CDS_SS_DERE: Read access to the atomic databases from Dere et al.

CDS_ATOMIC: Read access to CDS-related atomic data (line lists etc.).

5 Data organization

It's also useful to look at how the environment variables are organized with respect to how the data are stored.

5.1 SOHO archive

Some environment variables point to directories which are maintained on a SOHO archive system at the NASA Goddard Space Flight Center, and mirrored at other sites. These are, together with their normal definitions,

ANCIL_DATA	/soho-archive/public/data/ancillary
SOHO_EAP	/soho-archive/public/data/summary/asplanned
SYNOP_DATA	/soho-archive/public/data/synoptic

At sites where the SOHO archive is not available, these environment variables will either not be defined, or point to simulations of the SOHO archive.

5.2 Data files in /cs/data tree

Many of the environment variables will normally point to directories within a standardized data tree which is normally mounted on /cs/data. The master copy of this tree will be maintained on the CDS instrument workstations within the SOHO EOF at Goddard. The following is a list of these environment variables, together with a list of their standard definitions.

CDS_ATOMIC	/cs/data/atomic
CDS_CP_CVTFILES_W	/cs/data/plan/command/cvt
CDS_CP_LTBFILES_W	/cs/data/plan/command/ltb
CDS_CP_MISC_W	/cs/data/plan/command/misc
CDS_CP_TTCFILES_W	/cs/data/plan/command/ttc
CDS_CP_UPDATE_W	/cs/data/plan/command/misc
CDS_ENG_DATA	/cs/data/engineering
CDS_IAP_W	/cs/data/plan/iap
CDS_INFO_W	/cs/data/info
CDS_PLAN_TECH	/cs/data/plan/tech
TIME_CONV	/cs/data/time
ZDBASE_CDS	+/cs/data/plan/database

5.3 Data files in CDS archive

Some environment variables will point to directories which are too large to be part of the /cs/data tree. Instead, they will be maintained on a separate tree known as the 'large data' tree. These environment variables are:

CDS_VDS_CAL_INT	/cs/lrg_data/vds/cal/int
CDS_INFO_NOTE	/cs/lrg_data/info/swnote
CDS_SS_DERE	/cs/lrg_data/dere
CDS_GIS_RAW	/cs/lrg_data/gis/raw
CDS_MEM_DUMP	/cs/lrg_data/mem_dump
CDS_STM_DUMP	/cs/lrg_data/stm
CDS_TM_LOG	/cs/lrg_data/tm_log

Some other environment variables will point to directories which are large and necessarily site-specific. These environment variables are:

CDS_FITS_DATA
CDS_FITS_QLI

6 Login files

There are two login scripts distributed with the CDS software. These are:

`/cs/cds.login`	The login for the general science user.
`/cs/master.login`	The login script for the master user.

Only the master account should execute the file master.login. All other users should execute cds.login.

In addition to the environment variables listed above, the following enviroment variables are used to control the action of the login scripts. Each is optional. Where applicable, default values are shown.

CDS_TOP (/cs) The top of the CDS software tree. This is used both to determine the default value for some of the other environment variables, and in the default IDL startup script to define the IDL search path variable !PATH.

CDS_DATA ($CDS_TOP/data) The CDS auxiliary data directory tree.

CDS_LRG_DATA ($CDS_TOP/lrg_data) The CDS large auxiliary data tree.

SOHO_PUB_DATA (/soho-archive/public/data) The SOHO data archive tree.

CDS_IDL_STARTUP ($CDS_TOP/scripts/idl_startup.pro) The name of the IDL startup file.

CDS_SITE_LOGIN (No default) The name of a site-specific CDS login file. If this environment variable is defined, then the specified file is executed *after* cds.login

CDS_LOGIN ($CDS_TOP/cds.login) The name of the generic CDS login script. This is used by the master startup script to execute the generic script *before* the body of master.login is executed.

CDS_MASTER_SITE_LOGIN (No default) The name of a site-specific CDS login file for the master account. If this environment variable is defined, then the specified file is executed *after* master.login

If these variables are not defined, then they will be defined by the startup script to their default values. The site login scripts will only be executed if the appropriate environment variables are defined.

The site login script should be tailored to the current site and placed in a file pointed to by the CDS_SITE_LOGIN variable. Commands like the following can then be put in .cshrc to set everything up to run the CDS software.

```
setenv CDS_SITE_LOGIN /usr/local/cds.site.login
source /cs/cds.login
```

Alternatively, you can put the above commands in a shell script like the following, allowing the user to choose between the CDS customization of IDL or a more generic version.

```
#!/bin/csh
setenv CDS_SITE_LOGIN /usr/local/cds.site.login
source /cs/cds.login
idl
exit
```

For example, you could call this file “cdsidl” and place it in your “bin” directory. (Remember to use “chmod +x cdsidl” to make it executable.)

Low-level users should have additional definitions as necessary to define the write-access variables (see master.login) for their PRIVATE use.

If you wish to customize the IDL startup script, the easiest way to do that is include a link to the official startup script and then add any additional statements after that. The environment variable CDS_IDL_STARTUP makes a convenient pointer to the official startup file. For example:

```
@$CDS_IDL_STARTUP
!quiet = 1
window, 0
```