CORONAL DIAGNOSTIC SPECTROMETER
SoHO

CDS SOFTWARE NOTE No. 31

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MONITORING CDS MECHANICAL USE

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1 Introduction

It is a requirement during SOHO operations to monitor the usage of mechanical components within the CDS structure. Those items so far identified as requiring to be monitored are the scan mirror, slit and OPS mechanisms and the various mechanical control relays.

2 Environment variable

To use any of the log creation IDL procedures mentioned below, it is necessary to have the environment variable CDS_ENG_DATA_W defined as a directory to which the user has write privilege. The user MASTER will have this defined to point to the 'official' operations directory. Any other user wishing to create logs should define this variable to point to a PRIVATE directory.

To read the logs and display the data the variable CDS_ENG_DATA must be defined. At startup of the CDS software this points to the official log directory.

3 The Mechanisms

3.1 Introduction

Details of the movements of the CDS mechanisms (slit, mirror and OPS legs), are extracted from the telemetry and logged using the IDL procedure EMON_MECH_LOG. This procedure searches the telemetry files for raster and exposure packets and saves the selected data in an IDL save set. This limitation of using raster/exposure packet data means that the log will only record movements that form part of the science operations. If significant non-raster engineering-type use is made of the mechanisms then some alternative means of logging that information will have to be found.

3.2 Running the log creation program

The mechaism history is created by the procedure EMON_MECH_LOG which takes a single parameter specifying the files from which the telemetry is to be read. A variety of formats is possible. See the header documentation for details. A simple case could be where the procedure in run on a daily basis to process the previous day's files. In that case the command would be:

IDL> emon_mech_log, nnn

where nnn is the previous day's DOY number.

Each time the logger is run, it appends the new data to any already there.

3.3 Accessing the mechanism log

3.3.1 Using SHOW_CDS_MECH

The simplest way to access the mechanism log is to use the IDL procedure SHOW_CDS_MECH

This will retrieve the mechanism log and plot selected movement histories for the mechanisms. Each mechanism may be specified separately by using keywords and the time range of the plot may be specified. Use the IDL procedure CHKARG to see the keywords or XDOC to read the header documentation.

Two plots are created for each mechanism. The upper one gives a time plot of the movements ie if the mechanism moves from position (A) to position (B) starting at time (T) then a line is drawn on the plot from (T,A) to (T,B). The lower plot shows a cumulative histogram of all the locations passed through by the mechanism. If the keyword /fb is used in the call to SHOW_CDS_MECH, the lower plot also overplots the mechanism's forward (to increasing position values) and backwards movements individually.

3.3.2 Using the saved structure directly

The mechanism log is stored as an IDL SAVE file in the file:

$CDS_ENG_DATA/mechanism_log

This file can be RESTORED directly and the information will be in five variables, one for each mechanism. Each variable is a structure with .time (in TAI seconds) and .data tags. The five structures are named cds_mech_mpos, cds_mech_spos, cds_mech_snum, cds_mech_opsl and cds_mech_opsr.

4 The Relays

The relays which are currently monitored are given in Table I.

Description	Telemetry mnemonic
GIS HV1 27v	ASEGHV1
GIS HV2 27v	ASEGHV2
GIS HV3 27v	ASEGHV3
GIS HV4 27v	ASEGHV4
VDS Ballast heater	ASECOMP
GIS Filament select	ASEFILS
GIS Filament ON/OFF	ASEFIL
GIS electronics 5v	ASEG5V
GIS electronics 12v	A_POS_EG12V
Main heaters power	ASEHTRS
MCU 5v	ASEM5V
MCU 12v	A_POS_EM12V
VDS Standby 27v	ASEVSBY
VDS Supply 27v	ASEVDS
VDS HV 27v	ASEVHV
VDS Heater 27v	ASEVHTR

Table 1: CDS relays monitored

4.1 Creating the relay log

The IDL procedure EMON_RELAYS_LOG searches through the telemetry files for changes of state of the relays and records these in a data structure. The data structure is saved in an IDL save file and can thus be easily recalled for further analysis. Only operations staff should run this procedure (and hence create an updated save file) and it is expected the procedure will be run on a daily basis (probably as a batch job since it is likely to take in excess of an hour to process a complete day's telemetry files) to process the previous day's telemetry files. See the procedure header for further details on running it.

4.2 Accessing the relay log

The IDL procedure GT_RELAYS_HIST allows any user to recall the relay usage history in the form of an IDL array of structures. Users may then perform their own analysis using basic IDL commands. Eg.

```
IDL> gt_relays_hist, relay
IDL> print,n_elements(where(relay.par eq 'ASEHTRS' and relay.state eq 'ON'))
```

would print the number of times the main heater power relay has been switched ON.

Each element in the structure array contains an entry with the following tags.

Tag name	Description
par	parameter mnemonic name
time	the UT at which the change occurred
state	the state of the relay after the change
desc	a fuller description of the parameter

Table 2: Structure tags

It is anticipated that those with responsibility for maintaining a watchful eye over the mechanics will prepare a number of small IDL procedures to perform specific tasks using this data structure.