CORONAL DIAGNOSTIC SPECTROMETER
# SoHO

CDS SOFTWARE NOTE No. 36

Version 1 20 November 1995

# CDS QCM Monitoring

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# 1 Introduction

The CDS science stream telemetry can contain data from the Quartz Crystal Microbalance (QCM) which is placed within CDS to detect any environmental contamination. New readouts from each of the two QCMs are placed in the telemetry only when commanded from the ground or from on board tables. QCM1 is in the GIS part of CDS and QCM2 is within the NIS. Values are retrieved from each of these by the commands CB2Q1AL and CB2Q2AL. Each reading can be the result of either a short or long integration. Normally the long integration is used, but if or when contamination becomes significant, the frequency reading will overflow the on board counters and a short accumulation will be required.

# 2 Loading and running the on board series table

A CDHS series table has been created by D J Parker and this will be given an ID of 10. This table contains commands to perform the following QCM measures:

1) Five long QCM1 accumulations

2) Five long QCM2 accumulations

To load this table, send the following command from the EGSE TCL command window:

run CB5FILS 10 0 qcm.dt

To start the table running and create a standard set of QCM readings issue the command:

scc cb5runs 10

Each accumulation is of 33 seconds duration and a 60 second wait is commanded after the start of each. The result is that the procedure takes 10 minutes to execute. During this time the study ID display box in STM should display "ENG 10".

The QCM frequency data are contained in the Engineering B packets. In order to make the QCM history of CDS easily accessible, the QCM data can be extracted from the telemetry files using the IDL procedure EMON_QCM_LOG. That procedure samples the telemetry stream and saves the selected data in an IDL save set. The procedure requires write access to a directory in order to create the log. The system MASTER user will have write access to the 'official' log directory, but other users may define the environment variable CDS_ENG_DATA_W to point to a PRIVATE directory and the log may then be written.

The logging procedure eliminates duplicate telemetry values before storing in the log and so each running of the standard command file should result in 10 new QCM values being logged. If by chance two readings give the same frequency value, only one of them will be recorded.

# 3 Running the log creation program

The procedure EMON_QCM_LOG takes a single parameter which specifies the files from which the telemetry is to be read. A variety of formats is possible. See the header documentation for details.

Since the whole telemetry file must be searched, it takes approximately 15 seconds per file to create the log. Each time the logger is run, it appends the new data to any already there.

Operations staff, using the MASTER account should run this routine regularly in order to keep the QCM log up to date.

## 4 Accessing the QCM log

The simplest way to access the QCM log is to use the IDL procedure GET_QCM. ie

IDL> get_qcm, qcm

will return the QCM log data in the structure variable qcm. That structure has the tags

| Tag | Interpretation |
|---|---|
| .time | Time of the sample in TAI |
| .freq | Frequency sample |
| .t1 | Temperature of QCM1 |
| .t2 | Temperature of QCM2 |
| .g1 | Gain of QCM1 |
| .g2 | Gain of QCM2 |

Table 1: QCM structure

The temperature and gain tags contain calibrated data but the frequency value requires some further interpretation. If the data are from a long integration the frequency value in the structure must be divided by 33.554 to obtain a true frequency. This division is the default action performed in GET_QCM. Any trend to increasing contamination should be detectable if regular readings are taken and it should therefore be obvious if short accumulations are required in order to obtain a correct reading. The taking of short accumulations will have to be commanded 'by hand' or by running a suitably edited version of the standard table 10. Only if a revised version of table 10 (with an ID of 10) is run for short accumulations will the QCM data be automatically extracted from the telemetry. If those data are to retrieved by GET_QCM the keyword /SHORT should be used to indicate that the raw counts are to be divided by a factor of 2.097 instead of 33.554.

Hence to see a time plot of frequency for a long integration the user could enter the following:

IDL> get_qcm, qcm

IDL> utplot,tai2utc(qcm.time),qcm.freq

a time range can be specified on utplot if required.

## 5 Decontamination procedure

When the QCM data are analysed they should show frequencies in the range 1200-1300 Hz (QCM1) or 1100-1200 Hz (QCM2). If values approaching the limits of these ranges are seen, Barry Kent at

Rutherford Lab. should be contacted for advice. If approval for decontamination is received, the procedure is as follows:

1) Command QCM(1/2) heater ON - CBMQC(1/2)HN.

2) Monitor frequency until back within required range.

3) Command QCM(1/2) heater OFF - CBMQC(1/2)HF

4) Repeat for the other QCM if necessary.