SUBJECT:	**User Manual for Telecommand History and Out-of-Limits ingestion**
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2.1	19th May 2004	Added tchoolretrieve command line mode
2.2	16th February 2007	Added timeout & file server delete properties
2.3	13th November 2008	Support for DDS OOL files

Table of Contents

1. INTRODUCTION

This document is the software user manual (SUM) for the HCSS TC history and OOL ingestion processes.

1.1 Intended readership

This document is intended to be read by the user/operators of the HCSS TC history and OOL ingestion processes. The reader is assumed to be familiar with the terms telecommand (TC), out-of-limit (OOL) data, observation, block execution and the relationship between them.

1.2 Applicability statement

This issue of the HCSS TC history and OOL ingestion process SUM is applicable to release 0.2 of the HCSS. This corresponds to the first release of the HCSS to support the integrated system testing (IST) phase of the Herschel mission. This release continues to support the instrument level test (ILT) phase.

1.3 Purpose

This document describes how to use the TC history and OOL ingestion software. It details how to configure and start the ingestion processes and how to recover from any errors that may occur during the running of them.

1.4 How to use this document

This document consists of the following sections:
- Section 1, this section, explains the purpose and context of this document.
- Section 2 provides a brief overview of the TC history and OOL ingestion processes.
- Section 3 describes, in detail, how to configure and start the TC history and OOL ingestion processes.
- Appendix A describes the messages produced by the TC history and OOL ingestion processes that require operator action. For each message a diagnosis is made and the necessary recovery procedure is explained.
- Appendix B describes the warning and informational messages produced by the TC history and OOL ingestion processes. These messages do no require any action from the operator.

1.5 Related documents

[RD1] TC History Interface Control Document, M.J.Graham, SPIRE-ICS-DOC-000900, 1.0, 30th October 2002.

[RD2] OOL Data Interface Control Document, M.J.Graham, SPIRE-ICS-DOC-000974, 1.0, 30th October 2002.

[RD3] RTA-HCSS Data Interface Control Document, M.J.Graham, SPIRE-ICS-DOC-000975, 1.0, 30th October 2002.

[RD4] TC History Ingestion Technical Note, M.J.Graham, SPIRE-ICS-DOC-000###, 0.2, 18th March 2003.

[RD5] OOL Data Ingestion Technical Note, M.J.Graham, SPIRE-ICS-DOC-000###, 0.1, 18th March 2003.

[RD6] Interface Control Document, Data Disposition System, PT-CMOC-MDS-3108-OPS-GDS, 6 draft A, 10th January 2008.

1.6 Conventions

Where user supplied command line input is required the user supplied text is shown in bold and always preceded by a ">". For example, if the command line input "tchingest" is required, it will be shown as follows:

>tchingest

1.7 Problem reporting instructions

Problems detected in the TC history ingestion process should be reported using the Herschel SPR/SCR reporting system. This can be found at:

http://www.rssd.esa.int/herschel_webapps/servletsuite/ProblemReportServlet.

Errors detected in this document should be reported to Steve Guest.

2. INGESTION OVERVIEW

The ingestion processes (one for each of TCH and OOL) consist of the following components:

- A file retriever that extracts a Telecommand History file (THF) or an Out-of-Limits file (ORF) from SCOS-2000.
- A file server to handle requests for data. This is used during ILT to automate the ingestion process. It supplies to the appropriate ingestor with files via TCP/IP at periodic intervals. The file server uses a file retriever to extract the data.
- An ingestor to process the THF and ORF files and store the results in the database. This works both directly on files (IST-mode) and by communicating with the file server via TCP/IP (ILT-mode). The OOL ingestor also works with DDS format files as retrieved from the MOC in routine phase.

2.1 File Retriever

The file retriever is used to get the TC History and OOL files from SCOS. It performs the following steps:

- Establishes a connection with SCOS-2000.
- Requests the data for the particular time period from SCOS-2000.
- Receives the filename of the written THF or ORF from SCOS-2000.

A file retriever GUI interface is available for use in IST-mode.

2.2 File Server

The file server is used to get the TC History and OOL files from SCOS and make them available for ingestion. A separate file server is used for each of TC History and OOL, even though they are just instances of the same program in a different configuration. The file server performs the following steps:

- Receives a request from the ingestor for data for a particular time period.
- Uses the file retriever to get the data.
- Retrieves the file (THF or ORF) from the directory where SCOS-2000 created it.
- Sends the file to the ingestor.

If the connection with SCOS-2000 should be lost at any stage, the server waits for a specified duration and then tries to re-establish the connection. This will happen a specified number of times before the operation is aborted completely.

2.3 Data Ingestion

The majority of the steps associated with ingestion are the same for both TC History and OOL. Additional steps specific to one or the other are listed separately.

These steps are always performed:
- Check the validity of the configuration settings.
- Establish a connection with the identified database.
- Get the data (see sections below). This is different depending on whether the desired operation is "ILT-mode" or "IST-mode".
- Ingest the data (see section below).

2.3.1 Getting the data (ILT-mode)

In ILT-mode, the data is retrieved using a client-server configuration, with a File Server delivering the data. The following steps are performed:

- Establish a connection with the file server.
- Request the data file for a particular time period.
- Receive a data file from the server containing the requested data.

If the connection with the file server should be lost at any stage, the ingestor waits for a specified duration and then tries to re-establish the connection. This will happen a specified number of times before the operation is aborted completely.

The ingestor runs continuously and requests a new file after waiting for a specified duration.

2.3.2 Getting the data (IST-mode)

In IST-mode, the files to ingest are specified by the user as command line arguments. The user is responsible for transferring the files from the SCOS machine to the database machine e.g. by ftp.

2.3.3 Ingesting the data

The ingestors perform the following actions on each input file:

- Validate the contents of the file, including that the time window covered by the file is as requested.
- Use this file to create objects of the appropriate type.
- Check if any of these objects are already in the database. Any that are will not be ingested a second time.
- Make objects (that were not already there) persistent in the database. Note that this step is therefore performed even if the following step fails.
- Link them with associated objects wherever possible. If this is not possible, for example if the object does not exist, an error message is printed and the process continues.
- Commit the changes to the database.

2.3.4 Specific steps for the TC history ingestor

- The THF is checked that the first line is as described in [**RD-1**].
- Each TCHistory object is associated with its TC in the database, if there is one (there isn't for manual commands).
- The success flags of Observations and Block Executions covered by the THF are updated.
- The TC history objects are checked to ensure that there are none missing. This is done by looking for gaps in the TC IDs.

2.3.5 Specific steps for the OOL ingestor

- Each OOLPacket object is associated with the building block most closely matching it in time (again, if possible).

3. DATA INGESTION TUTORIAL

This section should aim to teach new users how to operate the software. The viewpoint is that of the trainee.

3.1 Configuring the ingestion processes

The TC history and OOL ingestion processes must be configured before they are started. They use the HCSS configuration mechanism. The following parameters are configurable by the user:

3.1.1 Database

hcss.tchool.database
This is the database to be used by the TC history ingestion process. The valid values for hcss.tchingest.database are location dependent. The default value is **sg55@truro** and must be overridden by the operator.

3.1.2 File servers

The following properties are used by the ingestors when communicating with the file servers.

hcss.tchool.tch.server
hcss.tchool.ool.server
The server machines on which the file servers reside. Any string is a valid input. The default value for both is
> **127.0.0.1**

hcss.tchool.tch.port
The port on the server machine to which the THF server is listening. The default value is
> **3187**

hcss.tchool.ool.port
The port on the server machine to which the ORF server is listening. The default value is
> **3188**

hcss.tchool.attemptwaittime
If for some reason the connection is lost with the file server, the ingestor tries to re-establish contact. This property specifies how long to wait before attempting to re-establish the connection. The value to be provided is the number of milliseconds to wait and the default value is:
> **60000**

hcss.tchool.maxattempts
If for some reason a connection cannot initially be re-established with the file server following a lost connection, the ingestor will retry re-establishing the connection. This property specifies the maximum number of attempts to be made to establish a connection for the THF Server for a particular THF. The default value is:
> **5**

hcss.tchool.fileperiod

The ingestor will attempt to get a file covering the period since the last successful attempt to get one. This property specifies how long to wait between attempts to get a file in milliseconds . The default value for hcss.tchingest.fileperiod is:

60000

3.1.3 SCOS-2000

The following properties are used by the file servers when communicating with SCOS-2000.

hcss.tchool.s2kserver
This is the machine on which SCOS-2000 resides. Any string is a valid input. The default value is:

127.0.0.1

hcss.tchool.s2kport
This is the port on the server machine to which SCOS-2000 is listening. The default value is:

2209

hcss.tchool.s2kdirectory
This is the directory on the server machine in which SCOS-2000 places files. Note that this directory must be visible to the file server processes. Note that TCH/OOL has no control over where SCOS writes its files; this is an input parameter only. The default value is:

/spired/HPR

hcss.tchool.s2ktimezone
This is the timezone that SCOS-2000 is set to. The default value is:

UTC

hcss.tchool.delete
This controls whether the files extracted from SCOS are deleted after being sent to the ingestion process. This only applies to server processes. The default value is:

true

hcss.tchool.timeout
This specifies the maximum wait time for a connection to be established in milliseconds. Currently it only applies to the SCOS connection. The default value is:

2000

3.1.4 Ingestors

hcss.tchool.dateformat
This parameter specifies how dates will be formatted in the hcss.tchool.tch.starttime and hcss.tch.ool.startime properties. Any format allowed by the java.text.SimpleDateFormat class can be used. The default format is:

yyyy/MM/dd-HH:mm:ss

A useful alternative that was used by the first version of this software and which corresponds to the format in the THF and ORF files might be:

yyyy.DDD.HH.mm.ss

hcss.tchool.tch.starttime
hcss.tchool.ool.starttime

When an ingestor is initially started, a file is requested covering the time period from the value of these properties to the time at which the ingestor is started. The format for these properties is specified by the hcss.tchool.dateformat. The default value for both is:

> **2003/10/20-15:00:00**

hcss.tchool.timetolerance

In time comparisons, two times are deemed to be equal if the difference between them in milliseconds is less than the value of this property. The default value is:

> **1000**

3.2 Getting the files from SCOS-2000

3.2.1 ILT (Client-Server) mode

Having configured the ingestion process, the file servers must first be started on the same machine as SCOS-2000 resides (or on a machine with visibility of the SCOS file system) by typing, for TC History and OOL respectively:

>thfserver
>orfserver

The ingestors will connect to these servers in order to get the files.

3.2.2 IST mode

In this mode there is no need to start the servers, and the files are explicitly retrieved from SCOS. To perform the retrieval, issue the command:

>tchoolretrieve [TC | OL]

Again, this must be on the same machine as SCOS-2000 resides (or on a machine with visibility of the SCOS file system).

If "TC" or "OL" is specified as a parameter, then data of that type will be retrieved based on the values of the appropriate "starttime" and "endtime" properties. Note that it is possible to override these on the command line using the "-properties" switch.

If no parameter is specified, then a GUI will appear. It is possible to select the type of retrieval (TCH or OOL), and the start and end time (in UTC). The displayed times default to the current time (for the end) and the value of the configuration parameter hcss.tchool.tch.starttime or hcss.tchool.ool.starttime as appropriate. Press the button "Retrieve file" to do just that.

3.3 Starting the ingestion processes

The ingestors are started by typing:

>tchingest [file1] [file2] …
>oolingest [file1] [file2] …

If no files are specified, the ingestors assume that client-server mode is requested and attempt to connect to the appropriate server.

When using **oolingest** with specified files, note that it attempts to determine whether a file is in SCOS format or DDS format by examining its name. If the file name ends in ".OOL" or ".TLM", it is assumed that the format is DDS; otherwise it is assumed that the format is SCOS.

A. Error Messages and Recovery Procedures

This section contains the messages signalled by the ingestion processes which require the operator to take action.

A.1 Ingestion exceptions

When an exception is thrown the ingestion process signals the exceptions and tries to continue. However, certain exceptions mean that the ingestion process cannot continue. The following ingestion exceptions are defined:

A.1 Configuration exception thrown

Exception: There has been a software error when using the Configuration framework. The ingestion process will stop, as it is not possible to read the configuration properties.
Action: Notify software support

A.2 Configuration file: maxattempts parameter not defined

Exception: The parameter that defines the maximum number of attempts that the ingestor will make to retrieve a particular file, hcss.tchool.maxattempts, has not been defined. The ingestion process will stop.
Action: Define hcss.tchool.maxattempts in the configuration file and restart the ingestion process.

A.3 Configuration file: waitattempts parameter not defined

Exception: The parameter that defines the waiting time between attempts to retrieve a particular file, hcss.tchool.waitattempts, has not been defined. The ingestion process will stop.
Action: Define hcss.tchool.waitattempts in the configuration file and restart the ingestion process.

A.4 Configuration file: file server parameter not defined

Exception: The parameter that defines the server on which the file server is running, hcss.tchool.tch.server or hcss.tchool.ool.server, has not been defined. The ingestion process will stop.
Action: Define hcss.tchool.tch.server and hcss.tchool.ool.server in the configuration file and restart the ingestion process.

A.5 Configuration file: specified file server unknown

Exception: The supplied file server host name is not recognized. The ingestion process will stop.
Action: Correct the names associated with hcss.tchool.tch.server and hcss.tchool.ool.server in the configuration file and restart the ingestion process.

A.6 Configuration file: file port parameter not defined

Exception: The parameter that defines the port on which the file server is listening, hcss.tchool.tch.port or hcss.tchool.ool.port, has not been defined. The ingestion process will stop.
Action: Define hcss.tchool.tch.port and hcss.tchool.ool.port in the configuration file and restart the ingestion process.

A.7 Configuration file: start time parameter not defined

Exception: The parameter that specifies the start time for the first file request, hcss.tchool.tch.starttime or hcss.tchool.ool.starttime, has not been defined. The ingestion process will stop.
Action: Define hcss.tchool.tch.starttime and hcss.tchool.ool.starttime in the configuration file and restart the ingestion process.

A.8 Configuration file: file period parameter not defined

Exception: The parameter that defines the time period between successive file retrieval attempts, hcss.tchool.fileperiod, has not been defined. The ingestion process will stop.
Action: Define hcss.tchool.fileperiod in the configuration file and restart the ingestion process.

A.9 Configuration file: database parameter not defined

Exception: The parameter that defines the database in which to store the TC and OOL objects, hcss.tchool.database, has not been defined. The ingestion process will stop.
Action: Define hcss.tchool.database in the configuration file and restart the ingestion process.

A.10 Configuration file: time tolerance parameter not defined

Exception: The parameter that defines the tolerance in milliseconds to be used when comparing two times, hcss.tchool.timetolerance, has not been defined. The ingestion process will stop.
Action: Define hcss.tchool.timetolerance in the configuration file and restart the ingestion process.

A.11 Configuration file: SCOS-2000 server parameter not defined

Exception: The parameter that defines the server on which SCOS-2000 is running, hcss.tchool.s2kserver, has not been defined. The server process will stop.
Action: Define hcss.tchool.s2kserver in the configuration file and restart the ingestion process.

A.12 Configuration file: SCOS-2000 port parameter not defined

Exception: The parameter that defines the port on which SCOS-2000 is listening, hcss.tchool.s2kport, has not been defined. The server process will stop.
Action: Define hcss.tchool.s2kport in the configuration file and restart the server process.

A.13 Configuration file: SCOS-2000 server unknown

Exception: The supplied SCOS-2000 host (server) name is not recognized. The TC server process will stop.
Action: Correct the name associated with hcss.tchool.s2kserver in the configuration file and restart the server process.

A.14 Configuration file: SCOS-2000 file directory unknown

Exception: The directory in which SCOS-2000 places the files is not recognized. The server process will stop.
Action: Correct the name associated with hcss.tchool.s2kdirectory in the configuration file and restart the server process.

A.15 Server: problem connecting to SCOS-2000 server

Exception: The file server cannot establish a connection with the SCOS-2000 server. The ingestion process will stop **(TBC)**.
Action: Check that the SCOS-2000 (HPR) server is running and restart the ingestion process. If the ingestion process continues to throw the exception then notify software support.

A.16 File Ingestion: attempt # at retrieving file has failed:

Exception: Attempt # at retrieving a file from the file server has failed. The TC ingestion process will not stop but will try to re-establish the connection every n1 milliseconds until a maximum of n2 attempts have been made. If it is still unsuccessful, the next scheduled successive file retrieval attempt will cover the time period of this request also. The values of n1 and n2 are specified by the hcss.tchool.attemptwaittime and hcss.tchool.maxattempts properties respectively.
Action: If the ingestion process continues to throw this exception then notify software support.

A.17 File Ingestion: maximum number of attempts to get file exceeded

Exception: The maximum number of attempts to retrieve a particular file from the server has been exceeded. The ingestion process will not stop but will now wait until the next scheduled attempt to retrieve a file. The time period request at the next retrieval attempt will include the time period covered by this set of failed attempts.
Action: If the ingestion process continues to throw this exception then notify software support.

A.18 File Ingestion: store exception:

Exception: There is a problem with starting a new database session. The ingestion process will stop.
Action: Notify software support. Check that the TCH & OOL persistent classes have been initialised in the database schema. Currently the **initv** command doesn't initialise these classes. It is possible to initialise all the classes in the CCM with a command like this:
>**java com.versant.DefineClass -db sg55@truro /home/hcssbld/hcss_builds/hcss_304/lib /herschel/versant/ccm**

A.19 File Ingestion: File not found

Exception: The ingestion process cannot find the transferred file. The ingestion process will stop.
Action: Notify software support.

A.20 File Ingestion: problem committing record # in list

Exception: There is a problem committing object # in the current list of objects to the database. The ingestion attempt will abort and the process will wait until the next scheduled file retrieval attempt.
Action: Notify software support.

A.21 File Ingestion: System waiting interrupted

Exception: An unexpected thread interrupt has occurred while the ingestor is waiting (sleeping) between successive file retrieval attempts. The ingestion process will continue as if the thread had slept for its full duration.
Action: Notify software support.

A.22   TCH Ingestion: Missing header record

Exception: The retrieved THF does not have a header record, The TC history ingestion attempt will abort and the process will wait (sleep) until the next scheduled THF retrieval attempt.
Action: Notify software support.

A.23   TCH Ingestion: Time format wrong in header record

Exception: The format of the time expressions in the THF header record is wrong. The TC history ingestion attempt will abort and the process will wait (sleep) until the next scheduled THF retrieval attempt.
Action: Notify software support.

A.24   TCH Ingestion: Command Data Record of incorrect length at line

Exception: The Command Data Record at line # in the current THF is of incorrect length. The TC history ingestion attempt will abort and the process will wait (sleep) until the next scheduled THF retrieval attempt.
Action: Notify software support.

A.25   TCH Ingestion: Bit Pattern Record of incorrect length at line

Exception: The Bit Pattern Record at line # in the current THF is of incorrect length. The TC history ingestion attempt will abort and the process will wait (sleep) until the next scheduled THF retrieval attempt.
Action: Notify software support.

A.26   TCH Ingestion: Parameter Data Record of incorrect length at line

Exception: The Parameter Data Record at line # in the current THF is of incorrect length. The TC history ingestion attempt will abort and the process will wait (sleep) until the next scheduled THF retrieval attempt.
Action: Notify software support.

B. Warning messages

The ingestion processes signals warnings of inconsistencies detected when processing a file retrieved from SCOS. The ingestion process continues. The user/operator must report these warnings to the relevant authorities for subsequent analysis. The following ingestion warnings are signalled:

B.1   Already in database

Warning: The specified object has already been ingested into the database, or at the least, the query used to locate it returned a non-zero set.
Action: Notify the relevant authorities.

B.2   TC # cannot be found in the database

Warning: TC # cannot be found in the database.
Action: Notify the relevant authorities.

B.3   Time of first TC in file differs from the requested file time by more than the allowed margin

Warning: The time stamp of the first or last TC in the THF differs from the requested time of the THF by more than the allowed margin (defined by the value of the hcss.tchool.timetolerance property).
Action: This could be symptomatic of a time mismatch between SCOS-2000 and the TC history ingestion process (in which case notify the relevant authorities) or the value of hcss.tchool.timetolerance is not large enough. If this warning continues, notify the relevant authorities.

B.4   File Ingestion: Current ingestion procedure aborting

Warning: The current ingestion attempt is aborting. No data from the current file is stored in the database. The ingestion process will wait (sleep) until the next scheduled file retrieval attempt. The time period for this attempt will cover that of the aborted attempt.
Action: Notify the relevant authorities.

B.5   TCH Ingestion: TCH # cannot be associated with an Observation or BB

Warning: TCHistory object # cannot be associated with an Observation or BB. This does not correspond to manual TCs.
Action: Notify the relevant authorities.

B.6   TCH Ingestion: TCH with time stamp … cannot be associated with an Observation or BB

Warning: TCHistory object with time stamp … (this corresponds to a manual TC) cannot be associated with an Observation or BB.
Action: No action required.

B.7   TCH Ingestion: TC # was not successful

Warning: The successful execution flag of TC # has been set to "unsuccessful" based on the TCHistory object.
Action: No action required.

B.8   TCH Ingestion: TC # has no history

Warning: TC # should have a corresponding TC History in the current THF but it is missing.
Action: Notify the relevant authorities.

B.9   TCH Ingestion: Cannot find Observations covering … to …

Warning: The TC history ingestion process cannot find Observations in the database covering the time period … to ….
Action: Notify software support.

B.10   OOL Ingestion: Couldn't associate observation for time …

Exception: The OOL ingestion process cannot find Observations in the database covering the given time.
Action: Notify software support.