TABLE 2: The Jungle with acronyms

Acronym	Meaning	Description
CD	Compact Disk	Mass produced (Audio) CD
CD-ROM	Compact Disk - Read-Only Memory	Mass-produced (silver) CD-ROM
CD-R	CD Recordable	Write-once, read-many CD
CD-RW	CD ReWriteable	Re writeable CD-ROM
DVD	Digital Versatile Disk	Mass-reproduced Video medium
DVD-ROM	DVD Read-only Memory	Mass-reproduced data disk 4.7, 9.4, 18.8 GB.
DVD-R	DVD Recordable	recordable DVD (3.95GB)
DVD-RAM	DVD random access memory	re-writeable DVD (2.6 GB)
DVD-RW	DVD re-writeable	re-writeable DVD (??)

edge only the latest version of the MacOS operating system has genuine support for it. The Unix world so far enjoys no support.

In order to obtain quick results and to be as compatible as possible with the existing archive tools and procedures we are using, we took a pragmatic approach: we contacted the developer of a public-domain CD-R recording tool “cdrecord” (a popular Linux tool, see below) and arranged with him to extend his software for the production of DVD-Rs as well. Within a few months, a workable system was delivered to us. However, due to the lack of software support for the DVD native UDF file system, we are using the standard CD-ROM format (650MB ISO9660) extended to 4GB. To the host computer, our “DVD-R” once written simply looks like an unusually large CD-ROM.

Projects and Schedules

The most pressing and demanding project in our archive for high-density storage media at the moment is the future 2.2-m telescope mosaic camera that will be commissioned in La Silla starting this October. If our tests and prototypes, together with juke box support are positive, the DVD technology will be the system of choice for this particular archive. Also, we have started to migrate the NTT archive from the current Sony 12″ optical disks to DVD. By the time this issue of *The Messenger* is distributed, we will have copied a few dozen Sony 12″ optical disks onto the new medium.

We still expect to have full UDF support later in 1999. Our current experience shows that the computer operating system will probably transparently identify and mount media using any of the standards. So the co-existence in the same jukebox of CD-R, DVD-R with ISO9660 and plain DVD-R with UDF should be no problem.

The next step, in 1999 or 2000 will be the gradual migration of our CD-Rs onto the new medium to save jukebox storage space, as this is by far still the largest part of the storage cost of CD-Rs.

For more information about this system, please contact the authors (`bpirenne@eso.org` or `malbrech@eso.org`). Information about “cdrecord” can be obtained from Jörg Schilling (`schilling@fokus.gmd.de`). The DVD-R recording device we are using is Pioneer model DVR-S101.

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How the Analysis of HST Engineering Telemetry Supports the WFPC2 Association Project and Enhances FOS Calibration Accuracy

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Introduction

The analysis of Hubble Space Telescope (HST) engineering telemetry at STScI is a process that evolved over time since launch in April 1990. Today a jitter file is computed for every dataset by a system called Observatory Monitoring System (OMS). The jitter files, produced to study the telescope pointing stability and the trends in the telescope/instrument performance within the orbital environment, are available for datasets taken after October 1994. These files are supposed to contain sufficient information for an astronomer to properly reduce scientific data.

This has two implications:

1. Jitter files for datasets before October 1994 are either missing or were computed differently.

2. Engineering parameters that are not part of the jitter files cannot be retrieved from the HST archive.

This article shows what kind of problems this can cause, and more importantly, how these problems were solved in case of the WFPC2 Association Project as well as the FOS Post Operational Archive.

Jitter and WFPC2 Associations

ST-ECF embarked on a project aiming at grouping, cosmic-ray cleaning and drizzling images taken by WFPC2 (Wide Field Planetary Camera). Therefore, very precise pointing information is required. The jitter files proved to be the most reliable source of pointing information, with a relative accuracy between two exposures in the same HST visit of about 0.01 arcsec (A. Micol et al. in this issue, related web page \r * MERGEFORMAT [6]). Furthermore, possible pointing instabilities of HST during an observation can be assessed which are sometimes leading to evident perturbation of the PSF (Fig. 2).

ECF’s archive interface includes a Java applet that draws X/Y plots of any two columns of a jitter file as seen in Figure 2. This can be done interactively through a common web browser (M. Dolensky et al. in this issue [5]).

Since WFPC2 replaced WFPC in December 1993, it was necessary to

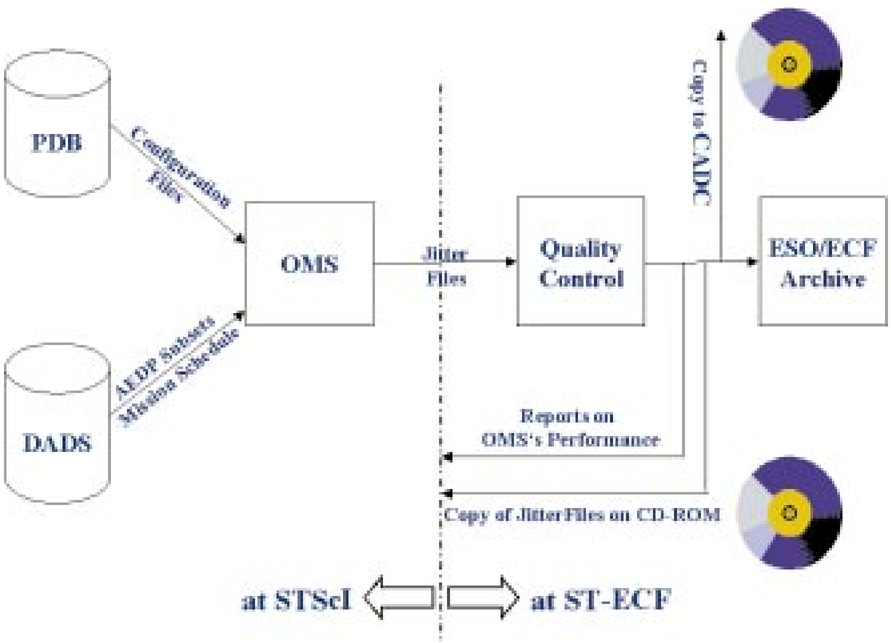

Figure 1: Jitter file generation pipeline remotely operated from ECF.

set up a pipeline at STScI to compute the missing jitter files for the time period December 1993 – October 1994. This pipeline (Fig. 1) was operated remotely from ECF and generated jitter files for additional 16,000 data sets of all HST instruments. The engineering telemetry came from the Data Archive and Distribution System (DADS) at STScI and the historical spacecraft configuration was reconstructed using the Project Database (PDB). The resulting jitter files were not only ingested into the ESO/ECF archive but were also shipped on CD-ROMs to the STScI and the Canadian Astronomical Data Center (CADC).

As a next step, the remote pipeline at STScI was enhanced, so that it is for the first time possible to compute the spacecraft jitter for the whole lifetime of HST in a homogeneous way.

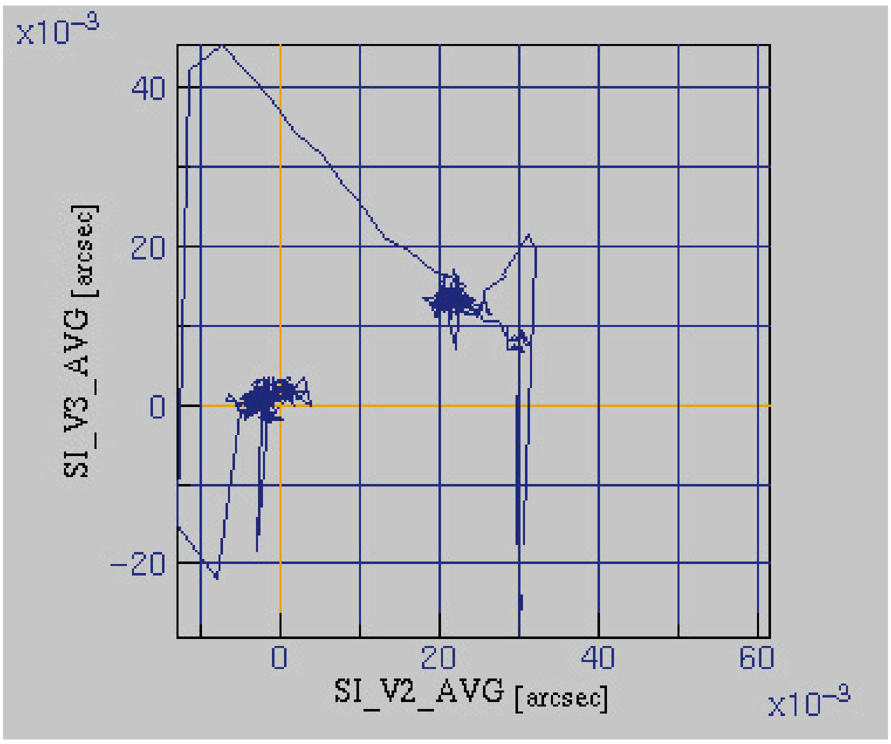

Figure 2: The plot shows how the telescope was moving relative to the guide stars during an exposure. For some reason, in the middle of this observation, HST's pointing moved by ∼25 marcsec, which corresponds to half a pixel of its planetary camera.

Engineering Telemetry and FOS Post Operational Archive

A different project that requires certain extra parameters of HST's engineering telemetry is the Faint Object Spectrometer (FOS) Post Operational Archive. Although FOS might be considered an oldie (it was replaced by STIS in February 1997) it's data are still precious and it will prove again the feasibility of the concept of predictive calibration that was jointly developed at ECF and ESO (M. Rosa).

There is, however, a small set of crucial input parameters missing for the recalibration, namely the magnetometer read outs of the on-board magnetometers. These magnetometer readings are required to estimate the particle-induced background count rate in the FOS digicons to scale geomagnetic shielding models. This became an issue, since there is a problem with the magnetic shielding of FOS, which was detected only after launch.

The solution was to prepare a software with the support of STScI that extracts the required telemetry values for the re-calibration. The extraction from the Astrometry and Engineering Data Processing (AEDP) subset files is currently done at ECF.

Outlook

In future, the Control Center System (CCS), currently developed at Goddard and STScI together with Lockheed, will include a data warehouse for direct access to historical telemetry. This will make it much easier to study the impact of certain parameters on scientific data.

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