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Gravity Probe B Relativity Mission

Data Processing through a Spacecraft Clock Reset
GP-B Procedure
P0904 Rev -

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Tom Langenstein ITAR Assessment Performed, ITAR Control Req'd? □ Yes □ No

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1.0 Revision History

Rev Level	Comments/notes	Date	Revised By
-	First release of this operational procedure	3-Apr-02	J Mullins

2. Scope

2.1. This operational procedure details the steps required to process real time and Solid State Recorder data to the Level 1 and Level 0 Sybase databases using software called "TDP" (Telemetry Data Processing) through a spacecraft clock reset. The database is detailed in S0331 and S0401, the Data Management Plan and Stanford Post-Processing Operations for Science Mission Data, respectively.

3. Operational Personnel Responsibilities and Qualifications

3.1. Operators must be competent working in a Unix environment and must understand such concepts as environment variables and working directories.

3.2. Operator familiarity with basic commands in the IDL programming language is recommended but not necessary.

3.3. The operator should have an understanding of the general structure of the spacecraft telemetry.

3.4. Operator must be on the lookout for a spacecraft clock reset within a specific data set.

3.5. If there are anomalies while performing this operation, these anomalies must be logged by the operator.

4. Requirements

4.1. Hardware and Software Requirements

Operations are performed on the Sun machine known as "science". Sybase server must be running and IDL software must be currently licensed. Data being processed must come from a recorded binary file in the format processed and sent by SAFS.

4.2. Configuration Requirements

The operator must be on in the directory /apps/supported/lasp, which always points to the most current version number.

4.3. Verification and Success Criteria

All data from a single SSR dump or real-time playback file is captured (entered without data loss) during a spacecraft clock reset.

5. Reference Documents

5.1. Data Management Plan, S0331

5.2. Stanford Post-Processing Operations for Science Mission Data, S0401

5.3. Lockheed Martin's SCSE-16, Section 9

5.4. Telemetry Data Processing (TDP) in the Non-Real-Time System, P0826

5.5. TCAD/TDP Version Description Document, S0503

6. Test Facilities

Mission Operations Center at Gravity Probe B, Stanford University.

7. QA Provisions:

QA notification of this procedure is not required. Its purpose is to explain how to process data through a spacecraft clock reset.

8. Test Personnel

This operational procedure is for use only by the data processing team. Presently that includes only:

Jennifer Mullins

Samantha Patterson

9. General Instructions

9.1. Test operators shall read this procedure in its entirety and resolve any apparent ambiguities prior to beginning any tests that reference this procedure.

9.2. Any nonconformance or operational anomaly should be reported by a Discrepancy Report. Refer to the Quality Plan, P0108, for guidance. Do not alter or break configuration if an operational failure occurs; notify database administrator and/or quality assurance.

10. Software Operational Procedure

10.1. This section describes how to: log on to a science client workstation; run P0826; notice or understand a telemetry problem; run tlmsplice.pl; properly re-run P0826 and end the session.

10.2. Log in to a moc or science client machine. If you are already logged on, then skip to the next step.

Enter login name: (If you don't have a login, ask the data processing or systems administration team for one.) Enter password after returning from login name prompt.

10.3. If you know there was a clock reset sometime during the time for the SAFS file you are going to process, you should run P0826 part one (up through Level 0 processing) and not run the second part (the Level 1 processing) on the file. Instead, run TLMsplice.pl on the p100.tmp output file of APID 100 data instead of sending it through to full Level 1 processing. Running TLMsplice will tell you exactly how much data was taken before and after the clock reset so that you can fix your Level 0 temporary files appropriately after finishing the TLMsplice Level 1 process.

10.4. If you do not know that you have a clock reset in your file, run P0826 on the telemetry file from SAFS or real-time playback. You should notice from the data processing summary that the earliest VTCW reported was “00000000”. This indicates a problem and probably a spacecraft clock reset. At this point, you should run TLMsplice.pl on the p100.tmp file to see if indeed there was a reset (TLMsplice.pl only reads p100.tmp and will not damage the file for future work).

10.5. Move your p100.tmp file to a suitable temporary work directory such as /home/tdp.

10.6. To run TLMsplice.pl, type:

```
/home/pmcgown/PERL/TLMsplice.pl p100.tmp
```

Where p100.tmp is your temporary processing filename.

You should see the program start and show you the following choices:

```
*****************************************************************
  HYDROACTIVE:  Which DEFAULT INPUT DIRECTORY do you want to use ?
```

```
                A    /home/pmcgown/TLMdata/
                B    /home/ftp/
                C    /home/davis/gpb/tdp/
                P    /home/tdp/
                N    (other)
*****************************************************************
```

Choose a work directory for files to be used by TLMsplice. Here we chose “P” and recommend that you consider working in this directory as a good temporary work space away from the formal /apps/supported directory.

```
operator_input = "P"
```

The program will respond with all of the file names in the chosen directory that are similar to your file name. Choose the one you wish to process (we have two examples here).

```
 * * * * * * * * * * * * * *
  p100.frame12928.tmp
  p100.frame5386.tmp
 * * * * * * * * * * * * * *
  INTERACTIVE:  FILENAME ?

operator_input = "p100.frame5386.tmp"
```

The number of bytes per row in p100.tmp will be required for splicing because this program can be used for many different data types. Choose 195 for the p100.tmp file because that is how many bytes per row are always stored in the APID 100 data temporary file.

```
 * * * * * * * * * * * * * *
  INTERACTIVE:  BYTES PER ROW (repeat cycle)
                195  (for CO pkt=100)?

operator_input = "195"
```

The VTCW byte offset for p100.tmp files is always 3. Enter 3 when asked.

```
 * * * * * * * * * * * * * *
  INTERACTIVE:  VTCW byte offset (less than   192 bytes)
                 3 (for CO pkt=100)?

operator_input = "3"
```

The program will begin its processing of the file, looking for resets and reporting the number of records in each whole time sequence (that is, from the beginning of one uninterrupted time sequence until the next interruption). Save this report so that you can use this information for other data types.

```
   Processing   2000:001:12:00:00  =>

    2000:001:12:00:00-2000:001:12:00:04       41 records
/home/tdp/p100.frame5386.tmp.splice.001
         fmt=  2  =>     41 packets

    2000:001:12:00:03-2000:001:12:00:10       65 records
/home/tdp/p100.frame5386.tmp.splice.002
```

```
          fmt=  2  =>     65 packets

    2000:001:12:00:09-2000:001:12:00:16       65 records
/home/tdp/p100.frame5386.tmp.splice.003
          fmt=  2  =>     65 packets

    2000:001:12:00:15-2000:001:12:00:22       65 records
/home/tdp/p100.frame5386.tmp.splice.004
          fmt=  2  =>     65 packets

    2000:001:12:00:21-2000:001:12:00:28       65 records
/home/tdp/p100.frame5386.tmp.splice.005
          fmt=  2  =>     65 packets
```

10.7. After the TLMsplice.pl program has finished, run TDP on each of the .splice.xxx files listed in the output (above), assigning each one (presumably during a single spacecraft clock reset, there will be only two files generated by TLMsplice.pl) the proper cycle number. The first file should have the same cycle number as your present clock data and the second file should begin a new cycle number in the Project Database.

10.8. Make an appropriate entry into the SCtime table to describe the exact TAI start time of the newest clock “zero” entry.

10.9. Process your remaining Level 0 data using either TLMsplice.pl (as described above but with other pXXX.tmp files for other APID types) or using the UNIX ‘splice’ and ‘od’ commands. Either way you choose, you will need to be consistent with your cycle number usage per step 10.7 above.

10.10. Log out of the workstation if all work is completed.

10.11. Alert the user community of a clock reset and issue a data processing summary to show what the new cycle numbers and corresponding start times are, along with the last VTCW in the previous cycle.