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Gravity Probe B Relativity Mission

Displaying APID 100 Telemetry Data in the Non-Real-Time System

GP-B   Procedure
P0827 Rev A

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1.0 Revision History

Rev Level	Comments/notes	Date	Revised By
-	First release of this operational procedure	17-Apr-01	J Mullins
A	Incorporated redlines into document.	11-Jun-01	J Mullins

2. Scope

2.1. This operational procedure details the steps required to view recorded real time and Solid State Recorder APID 100 (known as programmable telemetry) data in the Level 1 Sybase database using software called "TCAD" (Telemetry Checking, Analysis and Display). 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 and should know, generally, which times and monitors will be desired for display prior to starting TCAD.

3.4. 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 "moc-server". Sybase server must be running and IDL software must be currently licensed. Data displayed must have come from a recorded binary file as processed by TDP (see P0826.doc).

4.2. Configuration Requirements

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

4.3. Verification and Success Criteria

The TCAD graphical user interface starts, shows a menu and displays or exports data as desired.

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 view Level 1 satellite telemetry using TCAD. The validation of TCAD software is reviewed separately by QA.

8. **Test Personnel**

    This operational procedure is for use by the following personnel:

    Ken Pearce

    Jennifer Mullins

    Ron Sharbaugh

    Denys VanRenen

    Jeff Wade

    Randy Davis

    Ric Campo

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 the workstation; start TCAD; view and export Level 1 data in TCAD; and end the session.

    10.2. Logging on to the moc-server. If you are already logged on, then skip to the next step.

    Enter moc-server console login: (If you don't have a login, you should not be performing this procedure.) Make sure that either after or before typing your login name, but before hitting return or clicking on the OK button, to view the Options pull-down menu below the login area. The "Session" option should be set to Common Desktop Environment (CDE) for optimal TCAD appearance. It may also be set to "User's Last Desktop" if the user's last desktop session was using CDE.

    Enter password:

    10.3. Start TCAD to view Level 1data.

    Start TCAD by typing "tcad" at the prompt from any directory

    10.4. You should see the following information on the monitor:

    ```
    IDL Version 5.2 (sunos sparc). Research Systems, Inc.
    Installation number: 93897-0.
    Licensed for use by: Stanford University

    For basic information, enter "IDLInfo" at the IDL> prompt.

    % Compiled module: NEW_DT.
    ```

```
% Compiled module: DT_ADD_SECS.
% Compiled module: DT_DIF.
% Compiled module: CLOCK_TO_DT.
% Compiled module: DT_TO_STRING.
% Compiled module: STRING_TO_DT.
% Compiled module: CURRENT_DT.
% Compiled module: NEW_SCT.
% Compiled module: NEW_XT.
% Compiled module: SCT_ADD_SECS.
% Compiled module: SCT_DIF.
% Compiled module: DT_TO_SCT.
% Compiled module: SCT_TO_DT.
% Compiled module: DB_CONNECT.
% Compiled module: DB_DISCONNECT.
% Compiled module: DB_SELECT_PACKETS.
% Compiled module: DB_GET_PACKETS.
% Compiled module: DB_SELECT_EVENTS.
% Compiled module: DB_GET_EVENTS.
% Compiled module: DB_SELECT_TMDISCRETE.
% Compiled module: DB_GET_TMDISCRETE.
% Compiled module: DB_SELECT_TMANALOG.
% Compiled module: DB_GET_TMANALOG.
% Compiled module: DB_SELECT_TMAVERAGE.
% Compiled module: DB_GET_TMAVERAGE.
% Compiled module: DB_GET_TMINFO.
% Compiled module: DB_GET_SUBSYSTEMS.
% Compiled module: DB_GET_NAMES.
% Compiled module: DB_GET_MNEMONIC.
% Compiled module: DB_GET_TMDECOM.
% Compiled module: DB_GET_TMAVGID.
% Compiled module: DB_GET_CALIBRATION.
% Compiled module: DB_GET_STATES.
% Compiled module: DB_GET_LIMITS.
% Compiled module: TCAD_MAIN_EVENT.
% Compiled module: TCAD_MAIN.
% Compiled module: TCAD_INPUT_TIMES__DRAW.
% Compiled module: TCAD_INPUT_TIMES__GET.
% Compiled module: TCAD_ITEMS_LIST__DRAW.
% Compiled module: TCAD_ITEMS_LIST__GET_SUBSYSTEM.
% Compiled module: TCAD_ITEMS_LIST__DISPLAY_ITEMS.
% Compiled module: TCAD_ITEMS_LIST__GET_ITEM.
% Compiled module: TCAD_SELECTION_LIST__DRAW.
% Compiled module: TCAD_SELECTION_LIST__ADD_SELECTED_ITEM.
% Compiled module: TCAD_SELECTION_LIST__ADD_ITEM.
% Compiled module: TCAD_SELECTION_LIST__REMOVE_ITEM.
% Compiled module: TCAD_SELECTION_LIST__REMOVE_ALL.
% Compiled module: TCAD_TIME_STRING__PARSE_DATE_TIME.
% Compiled module: TCAD_TIME_STRING__PARSE_DELTA_TIME.
% Compiled module: TCAD_TIME_STRING__PARSE_TIME.
% Compiled module: TCAD_VALUE__FETCH_ALL.
% Compiled module: TCAD_VALUE__DELETE_ALL.
% Compiled module: TCAD_PLOT__SET_XWINDOWS.
% Compiled module: TCAD_PLOT__SET_POSTSCRIPT.
% Compiled module: TCAD_PLOT__DRAW_PAGE.
% Compiled module: TCAD_PLOT__DRAW_DISCRETE.
% Compiled module: TCAD_PLOT__DRAW_ANALOG.
% Compiled module: TCAD_PLOT__PREPARE_PRINT_EVENT.
% Compiled module: TCAD_PLOT__PREPARE_PRINT.
```

```
% Compiled module: TCAD_PLOT__SETUP_EVENT.
% Compiled module: TCAD_PLOT__SETUP.
% Compiled module: TCAD_TABLE__CREATE.
% Compiled module: TCAD_TABLE__PREPARE_PRINT_EVENT.
% Compiled module: TCAD_TABLE__PREPARE_PRINT.
% Compiled module: TCAD_TABLE__SETUP_EVENT.
% Compiled module: TCAD_TABLE__SETUP.
% Compiled module: TCAD_DISPLAY_EVENT.
% Compiled module: TCAD_DISPLAY.
% Compiled module: TCAD_DISPLAY__RESTORE_EVENT.
% Compiled module: TCAD_DISPLAY__RESTORE.
% Compiled module: TCAD_DISPLAY__SAVE_EVENT.
% Compiled module: TCAD_DISPLAY__SAVE.
% Compiled module: TCAD_INITIAL_PRINTER.
% Compiled module: TCAD_TMINFO_EVENT.
% Compiled module: TCAD_TMINFO.
% Compiled module: XMANAGER.
```

If you do not receive this list and get an error message containing the function "ct_connect()", you may have a problem with Sybase. Sybase may be down. Sybase is necessary for TCAD to properly function. If this is the case, please contact the database administrator. Sybase being down does not require the filing of a TAR.

At this point, the TCAD menu will pop up in the top left hand corner of the screen. To see your data, choose the Display menu and select the option "Display TM Data".   To learn more about the different monitors, choose "TM Info" instead. Once you choose a menu item, a few more TCAD modules will be compiled by IDL in the background. You may see the list continuing as follows:

```
% Compiled module: LOADCT.
% Compiled module: FILEPATH.
% LOADCT: Loading table Rainbow + white
% Compiled module: CW_FIELD.
% Compiled module: CW_BGROUP.
% Compiled module: CW_FSLIDER.
% Compiled module: RSTRPOS.
% Compiled module: REVERSE.
% Compiled module: STR_SEP.
% Compiled module: PLOT_FMT_SELECT.
```

10.4.1. Choose monitors for which to view data. As an example, in Sim 1B, we chose the following monitors with the following time stamps:

[In EPS subsystem] VW_SPRU_Input - Solar Array voltage to SPRU input
[In VES subsystem] TA_Pkt3_Wrd14 - Thruster #13 Temperature (2s completment, LSB = T)
[In COM subsystem] SX_BCmd3FrqOfst - B command 3 frequency offset data setting
[In ATC subsystem] SF_TotalRoc - Total Roc Of Both Batteries.

10.5. These monitors were chosen for their diverse data types and also because data was known to exist in the database for these monitors.

Time input is necessary to view data. The time entries are at the top of the display screen. The format is day-of-year. In Sim 1B, the time was from 2000/300-16 to 2000/300-19 Please note that time in TCAD is with respect to the on-board clock. It is listed year/day-of-year – hour in GMT. There exists a translation algorithm from spacecraft clock to GMT; the data itself is stored with respect to the Vehicle Time Clock Word (see S0401 for details).

One may display the data either as a table or a plot. Display options are available in the lower right corner. Both tables and plots are available for viewing. Printing or saving to a file is also possible, and present file format is tab-delimited ASCII postscript.

10.6. Exit TCAD using the menu in the upper left corner when desired

10.7. Log out of the moc-server if no further work is to be done.