and control computers to tell them which satellites to track.

To help prevent Ku-band irradiation of the Earth, TTaGS accepts input from the user about horizon tolerance and accordingly restricts activation and effects deactivation of the transmitter. TTaGS can be modified easily to enable tracking of additional satellites and for such other tasks as reading Sun-rise/set tables to generate commands to point the solar photovoltaic arrays of the International Space Station at the Sun.

This program was written by Dan E. Jackson of Barrios Technology for Johnson Space Center. For further information, contact the Johnson Commercial Technology Office at (281) 483-3809. MSC-23588-1

PPM Receiver Implemented in Software

A computer program has been written as a tool for developing optical pulse-position-modulation (PPM) receivers in which photodetector outputs are fed to analog-to-digital converters (ADCs) and all subsequent signal processing is performed digitally. The program can be used, for example, to simulate an all-digital version of the PPM receiver described in "Parallel Processing of Broad-Band PPM Signals" (NPO-40711), which appears elsewhere in this issue of *NASA Tech Briefs*. The program can also be translated into a design for digital PPM-receiver hardware.

The most notable innovation embodied in the software and the underlying PPM-reception concept is a digital processing subsystem that performs synchronization of PPM time slots, even though the digital processing is, itself, asynchronous in the sense that no attempt is made to synchronize it with the incoming optical signal *a priori* and there is no feedback to analog signal-processing subsystems or ADCs. Functions performed by the software receiver include time-slot synchronization, symbol synchronization, coding preprocessing, and diagnostic functions. The program is written in the MATLAB® and Simulink® software system. The software receiver is highly parameterized and, hence, programmable: for example, slot- and symbol-synchronization filters have programmable bandwidths.

This program was written by Andrew Gray, Edward Kang, Norman Lay, Victor Vilnrotter, Meera Srinivasan, and Clement Lee of Caltech for NASA's Jet Propulsion Laboratory.

In accordance with Public Law 96-517, the contractor has elected to retain title to this invention. Inquiries concerning rights for its commercial use should be addressed to:

Innovative Technology Assets Management
JPL
Mail Stop 202-233
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E-mail: iaoffice@jpl.nasa.gov

Refer to NPO-40712, volume and number of this NASA Tech Briefs *issue, and the page number.*

Tropospheric Emission Spectrometer Product File Readers

TES Product File Reader software extracts data from publicly available Tropospheric Emission Spectrometer (TES) HDF (Hierarchical Data Format) product data files using publicly available format specifications for scientific analysis in IDL (interactive data language). In this innovation, the software returns data fields as simple arrays for a given file. A file name is provided, and the contents are returned as simple IDL variables.

This work was done by Brendan M. Fisher of Caltech for NASA's Jet Propulsion Laboratory. For more information, see http://tes.jpl.nasa.gov/.

This software is available for commercial licensing. Please contact Karina Edmonds of the California Institute of Technology at (626) 395-2322. Refer to NPO-47000.

Reporting Differences Between Spacecraft Sequence Files

A suite of computer programs, called "seq diff suite," reports differences between the products of other computer programs involved in the generation of sequences of commands for spacecraft. These products consist of files of several types: replacement sequence of events (RSOE), DSN keyword file [DKF (wherein "DSN" signifies "Deep Space Network)], spacecraft activities sequence file (SASF), spacecraft sequence file (SSF), and station allocation file (SAF). These products can include line numbers, request identifications, and other pieces of information that are not relevant when generating command sequence products, though these fields can result in the appearance of many changes to the files, particularly when using the UNIX diff command to inspect file differences. The outputs of prior software tools for reporting differences between such products include differences in these non-relevant pieces of information.

In contrast, seq diff suite removes the fields containing the irrelevant pieces of information before processing to extract differences, so that only relevant differences are reported. Thus, seq diff suite is especially useful for reporting changes between successive versions of the various products and in particular flagging difference in fields relevant to the sequence command generation and review process.

This program was written by Teerapat Khanampornpan, Roy E. Gladden, and Forest W. Fisher of Caltech for NASA's Jet Propulsion Laboratory.

This software is available for commercial licensing. Please contact Karina Edmonds of the California Institute of Technology at (626) 395-2322. Refer to NPO-45438.

Coordinating "Execute" Data for ISS and Space Shuttle

The Joint Execute Package Development and Integration tool is a Web utility program that provides an integrated capability to generate and manage messages and "execute" package data for members of a space shuttle and the International Space Station (ISS). (An "execute" package consists of flight plans, short-term plans, procedure updates, data needed to operate the space-shuttle and ISS systems, in-flight maintenance procedures, inventory-stowage data, software upgrades, flight notes, scripts for publicized events, and other instructions.) This program is a third-generation "execute"-package Web tool, built on experience gained from two programs used previously to support realtime operations.

This program provides integration and synchronization between the space-shuttle and ISS teams during joint operations. Hundreds of messages per week must be uplinked as "joint" messages; that is, messages for crewmembers of both spacecraft. The program includes configuration-management components that ensure that the same message goes to both crews and spacecraft, effectively eliminating the potential for error in manual direction of messages. The program also controls the format and layout of the crews' Web pages, ensuring consistency between uplinks. If the crews' Web pages were edited man-