

Generic Trending System (GTS)

This makeshift trending system archives FAST engineering data in a format that is easily retrievable for long-term trending. The meat of the program is a glorified shell script called *gts*.

gts first queries the FAST database for the location of files containing data over the requested timespan. Then it starts *sdt_batch* to load the data into shared memory buffers (SMBs). *sdt_batch* then calls an IDL routine to snatch the data from the SMBs into IDL data structures. The IDL routine then saves the structures to disk for later retrieval.

When all the data is saved and ready to be plotted, an IDL routine called *gts_concatenate.pro* loads the data from disk files into memory. From there, the data can be plotted with ease.

Storing Long Periods of Data

The data storage phase of trending can be fully automated, but there are a few configuration files that must be created first.

SDT Plot Configuration File

SDT is the only program that can load FAST data from the data files received from the ground stations. It needs a Plot Configuration file to know which data quantities to load. You must build the Plot Configuration initially by running *sdt* interactively and saving the configuration to a file.

1. Start *sdt* on the command line. This is the interactive version of the program; *sdt_batch* is the non-interactive version.
2. Using the pop-up menus, build a plot with all desired data quantities.
3. Save the Plot Configuration to a file on disk.
4. Load some data into the plot using Data Manager.
5. In the Data Manager window, click on "Select Apids" to see which apids are required for this data set. Record this list.
6. On the command line, run the utility called *showDQIs* and note the names of all the "Data Quantity Instances" that have been loaded into memory. You will need this list to build the GTS configuration file below.

GTS Configuration File

This file contains all the settings needed to trend the desired data. Here is an example:

```
# Configuration file for trending MCP quantities with GTS
project=mcp
DQIlist="E1MCPAV E1MCPAI E1MCPBV E1MCPBI"
DQIunits="V I V I"
apids="1084"
output_dir=/disks/juneau/scratch/LZPfiles/trend/esa_mcp/dat
DataDirectory=/disks/juneau/scratch/LZPfiles/trend/esa_mcp/lzp
PlotConfig=/disks/fast/software/config/PlotConfigs/esa_mcp
```

The first entry **project** is simply a string to identify the task, and will be part of the output file-names. **DQIlist** is a quoted, space-separated list of DQIs as determined by running *showDQIs* above. **DQIunits** is a list of engineering units corresponding to **DQIlist**. The next entry is the list of **apids** that contain the desired data. **output_dir** is where gts will save the data files. **DataDirectory** is where gts will temporarily store data files for loading into sdt. **PlotConfig** is the name of the Plot Configuration saved when running sdt initially in interactive mode. (Note that the true name of this file is *Uicfg.esa_mcp*.)

Running GTS

Once you've created the GTS configuration file and the SDT Plot Configuration, you're ready to run *gts*. It is recommended you process ten days or less in each run because longer periods are less reliable. When trending data for longer periods, break up the job into sets of ten days each. Trending the last month of the millenium might look like this:

```
gts -c gts_config_file 1999 335 345
gts -c gts_config_file 1999 346 356
gts -c gts_config_file 1999 357 365
```

If you were using the configuration file above, the output files would be:

```
/disks/juneau/scratch/LZPfiles/trend/esa_mcp/dat/mcp_1999_335_345.dat
/disks/juneau/scratch/LZPfiles/trend/esa_mcp/dat/mcp_1999_346_356.dat
/disks/juneau/scratch/LZPfiles/trend/esa_mcp/dat/mcp_1999_357_365.dat
```

These files would contain all the desired data quantities, and load easily into IDL for plotting.

Loading and Plotting Data

Now that you have stored all your data in files readable by IDL, you want to load them into IDL to produce a grand plot.

The IDL procedure *gts_concatenate.pro* loads any number of saved data files into structures for easy plotting with the utility *tplot.pro*. Here's an example of loading and plotting all data saved in a directory:

```
IDL> gts_concatenate, $
      quant=[ 'E1MCPAV', 'E1MCPAI', 'E1MCPBV', 'E1MCPBI' ], $
      data_dir='/disks/juneau/scratch/LZPfiles/trend/esa_mcp/dat'

IDL> tplot, [ 'E1MCPAV', 'E1MCPAI', 'E1MCPBV', 'E1MCPBI' ]
```