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Title		Google Earth Telemetry Utility - GETU	
Revision	Date	Prepared By	Change History
1.0	10/20/2010	Tim Munn	Initial release

Introduction to GETU

The Google Earth Telemetry Utility - GETU - is an Excel spreadsheet designed to transfer GPS positional data in Google Earth. The GETU receives GPS coordinates via the MoTeC Telemetry Monitor and draws a path in Google Earth in real time.

Features

- AutoTracking option lets you keep the view of Google Earth centered on the current location of the vehicle.
- Option to automatically clear data on end of lap to avoid overlapping paths.
- Watch the live vehicle's path as it traces a prior saved path.
- Save KML files to keep a record of your vehicle's path for viewing at a later time.
- Save replay files to later watch the vehicle's playback around its path.
- Customize the path with two display styles and several colors.
- Compatible with MoTeC ACL and ADL3 with Telemetry Monitor version 2.3 or later.

The screenshot displays the GETU Excel spreadsheet interface. On the left, a Google Earth map shows a yellow track on a city street grid. The spreadsheet on the right contains the following data:

Team Name	Event	Date:	10/22/2010	
LOCKED	Protection		-2.18	
Lap Number:	Sats Used:	Start DDE	Stop DDE	Clear
Disabled	9	Start GE	Make KML	Clear On Lap OFF
Latitude	Longitude	Options	Make Replay	Auto Tracking OFF
Current				
	33.7492939	-118.0417326		
Recorded Data				
15	33.7329721	-118.0364291		
16	33.7329811	-118.0364566		
17	33.7329901	-118.0364745		
18	33.7330075	-118.0364986		
19	33.7330455	-118.03653		
20	33.7330991	-118.0365546		
21	33.7331733	-118.0365696		
22	33.7332535	-118.0365743		
23	33.7333546	-118.0365743		
24	33.7334447	-118.0365746		
25	33.733554	-118.0365753		
26	33.733658	-118.0365763		
27	33.7337695	-118.0365786		
28	33.733883	-118.03658		
29	33.7340095	-118.0365813		
30	33.7341421	-118.0365828		
31	33.7342721	-118.0365845		
32	33.7344186	-118.0365866		
33	33.7345528	-118.0365886		
34	33.7346877	-118.036592		

A 'Display Style' dialog box is open, showing options for Path Style (Clamp To Ground, Telegraph), Line Color (Yellow), AutoTracking (Altitude: 250, Tilt: 30), and Update on (DeviceUpTime, Engine RPM).

Logger Setup

Setup “Latitude(2)” and “Longitude(2)”

If you have the “GPS for Google Earth” Template:

- Depending on your logger manager software, find the “Communications” menu item under either “Inputs or “Connections.”
- Select the “GPS for Google Earth” template into the RS232 slot, or if using a STC choose one of the empty CAN slots. If you already have a GPS template, replace it with this new one. Note the “Select” button requires the template to be saved in the default comms directory, otherwise use the “Advanced” button and then click “Load” to select the template if saved elsewhere.

If you do not have the “GPS for Google Earth” Template:

- Navigate to the “Communications” menu item
- Select the existing GPS input template and select the “Advanced” button.
- Under the “Received Channels” tab find the “GPS Latitude” channel and select “change”, note the value of the “variable field”. Go back and click “Add” selecting the “GPS Latitude (2)” channel. Set the value in the “variable field” to the value you noted above. Be sure that the decimal format is “As Received.”
- Repeat Step c for “GPS Longitude”/“GPS Longitude (2)”

Generate channels “GPS Lat Small” and “GPS Long Small”

- Navigate to “Calculations” | “Channel Maths”
- Add a new expression, selecting “GPS Latitude (2)” as the input channel. Be sure the operation drop down menu is set to “none.”
- Under “Output” click select. Choose a general purpose, unitless (0dps) channel and rename it “GPS Lat Small.” Click “Ok.”
- Repeat steps a-c for “GPS Long Small” using “GPS Longitude(2)”

Generate channels “GPS Lat Large” and “GPS Long Large”

- Navigate to “Calculations” | “Advanced Maths”
- Add a new expression. For the output channel choose a general purpose, unitless (0dps) channel and rename it “GPS Lat Large.”
- Type in this expression: $(\text{‘GPS Latitude(2)’[deg]} * 10000000) / 65536$
- Select “Ok”
- Repeat steps a-d for “GPS Long Large” using “GPS Longitude(2)”

Adding GPS Channels to Telemetry

- Navigate to “Functions” | “Telemetry”
- Select “Add”
- Under the search tab, add these channels to the telemetry list:
 - “GPS Lat Small”
 - “GPS Lat Large”
 - “GPS Long Small”
 - “GPS Long Large”
 - “GPS Sats Used”
 - “Engine RPM” or “DeviceUpTime”
 - “Lap Number” (Optional: for use with ClearOnLap function)

Telemetry Setup

Open your MoTeC Telemetry Monitor. Navigate to “Settings” | “Communications” | “DDE”
Check the box “Send Telemetry Data via DDE” with the delay set to 1 second.

Using GETU

GETU Controls:

Start DDE:

Starts the link to Telemetry Monitor and begins receiving GPS data.

*** Note: Have Telemetry Monitor running before starting DDE ***

Stop DDE:

Pauses the input of data from Telemetry Monitor.

Clear:

Removes all data in the spreadsheet. (Be sure to save your KML file if you do not wish to lose your Google Earth path)

Start GE:

Opens Google Earth and loads your KML file.

Make MKL:

Creates a KML file from the data in the spreadsheet.

Make Replay:

Creates a Replay KML file from the data in the spreadsheet.

Clear On Lap:

This option when active will clear the data each lap based on an update of the channel called "Lap Number".

Auto Tracking:

This option when active will cause the viewport in Google Earth to track the front of the GPS path. The altitude and tilt of the camera can be adjusted under the Options menu. Activating this option will open Google Earth.

Options:**Auto Tracking:****Altitude:**

Specify the height at which to view the path.

Tilt:

Specify the viewing angle at which to view the path.

LineStyle:**ClampToGround:**

The line of the path is drawn directly on the surface of the Earth.

Telegraph:

Each point of data creates a "telegraph pole," using the specified height, which are connected via a wall extending down from the path. This option makes the path easier to see at a distance.

Line Color:

Changes the color of the path.

Other:

Update On:

For the spreadsheet to update correctly, at least one updating channel is required on the worksheet. Most common will be "Engine RPM." It could also use "DeviceUpTime" if you are not sending "Engine RPM" through Telemetry.

Tracing A Pre-Run Track Path

Have GETU running when you make your pre-run. Once finished, save the KML file and open it in Google Earth. Now clear the data in GETU and when you run it live, you can watch your vehicle overlap the pre-run path in real time. It is recommended to make the paths different colors.

Notes On KML Files:

Google Earth uses Keyhole Markup Language (KML) files to display placemarks and paths. Google Earth can have many KML files open at the same time. The KML file that the "Make KML" button produces is exactly the same as the one used while the GETU is running. Load this file whenever you wish to see the path run by your vehicle. The KML file produced by the "Make Replay" button is different in that it allows the user to watch the vehicle run its course like a movie with controls to play, pause, and rewind.

Troubleshooting

I click Start DEE and the GETU doesn't show any data.

Make sure your logger is configured as above:

- Are the GPS channels being created correctly?
- Are the GPS channels named exactly as above?
- Are the GPS channels coming through telemetry?

Check to make sure DDE is turned on in Telemetry Monitor.

I click Start GE and nothing happens.

Your Google Earth executable may be in an abnormal directory.

Correct directory: "C:/Program Files/Google/Google Earth/client/googleearth.exe"

If you experience this problem you can load the "GoogleEarthRefresher.kml" file manually from the "C:/motec" directory.