VIAVI Solutions

Application Note

An Explanation of File Formats that can be Exported from and Imported to the GPSG-1000

The GPSG-1000 has the ability to import and export a number of different file types for different uses. The file types include Almanac, KML, NMEA (Trajectory), Route, Settings and Waypoint. This document will attempt to explain the content of each of the file types that are able to be exported and imported onto the unit so the user can understand the content and format of each.

File Locations

Within the GPSG-1000, the various user files are stored on a static memory device, and with the exception of the load, store, manage, delete, import and export functions provided to the user through the UI, the user cannot further manipulate the files while they are contained within the unit. The user can however export the files to a USB drive where they can be accessed, edited and stored, and then using the import function of the GPST-1000, they can be reloaded onto the unit for use. When the various file types have been loaded onto a USB stick, Figure 1 shows the directories are created under the /Aeroflex directory which is located at the root of the USB device:

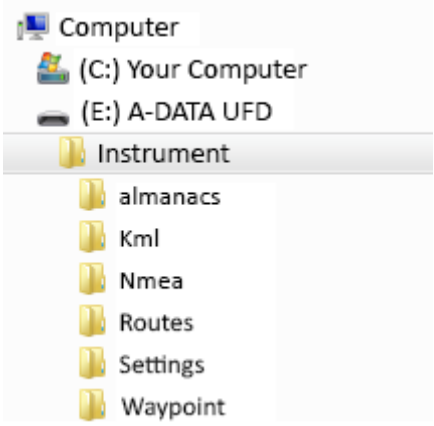

Figure 1. File Locations

Almanacs Files

The Almanacs directory contains almanac files in Yuma format (ICD-GPS-8.70 Rev A, Date Jun 15, 2011). The Almanacs files are either generated by the GPSG-1000 internal receiver downloads, or are downloaded from the United States Coast Guard repository website. An example of the Almanac data file is seen in Figure 2.

```
******** Week 799 almanac for PRN-01 ********
ID:                         01
Health:                     000
Eccentricity:               0.3730297089E-002
Time of Applicability(s):   61440.0000
Orbital Inclination(rad):   0.9613649345
Rate of Right Ascen(r/s):   -0.7863184676E-008
SQRT(A)  (m 1/2):           5153.619629
Right Ascen at Week(rad):   0.9558857469E+000
Argument of Perigee(rad):   0.444257464
Mean Anom(rad):             -0.1754657556E+001
Af0(s):                     -0.1144409180E-004
Af1(s/s):                   0.0000000000E+000
week:                       799
```

Figure 2. Almanac File Example PRN-01

Kml Files

The Kml directory contains files generated from the application GoogleEarth in Kml format on a PC, which have then been imported onto the GPSG-1000. The GPSG-1000 compiles the Kml files into Trajectory data files with a .gdt extension in CSV format.

Kml files are trajectory routes that are intended to follow a course laid out in GoogleEarth at a constant velocity. The files must have certain conditions; the altitude must be expressed in absolute terms, navigation points must be properly positioned for the speed and turning radius of the simulation. Therefore it is generally not suitable to convert recorded routes from a GPS receiver in to Kml files for simulation in the GPSG-1000. Recorded routes should be loaded to the GPSG-1000 as Nmea Files for playback.

The compiled .gdt files are is the following format:

```
Notes,Date,Time,Latitude,Longitude,Alt,Desc
$GDT,20000101,000144.00,38.9425699612859,-94.7561817577427,0.000000,3D,*16
$GDT,20000101,000145.00,38.9425695029864,-94.7561783124509,-0.000004,3D,*3F
$GDT,20000101,000146.00,38.9425681280874,-94.7561679765759,-0.000018,3D,*34
$GDT,20000101,000147.00,38.9425658365869,-94.7561507501185,-0.000039,3D,*39
$GDT,20000101,000148.00,38.9425626284821,-94.7561266330799,-0.000069,3D,*37
$GDT,20000101,000149.00,38.9425585037686,-94.7560956254621,-0.000106,3D,*35
$GDT,20000101,000150.00,38.9425534624409,-94.7560577272674,-0.000150,3D,*3E
$GDT,20000101,000151.00,38.9425475044924,-94.7560129384988,-0.000200,3D,*34
$GDT,20000101,000152.00,38.9425406299151,-94.7559612591597,-0.000254,3D,*3F
$GDT,20000101,000153.00,38.9425328387000,-94.7559026892542,-0.000312,3D,*3A
$GDT,20000101,000154.00,38.9425241308367,-94.7558372287867,-0.000371,3D,*34
$GDT,20000101,000155.00,38.9425145063137,-94.7557648777623,-0.000431,3D,*3F
$GDT,20000101,000156.00,38.9425039651181,-94.7556856361865,-0.000489,3D,*30
```

Figure 3. .gdt File Expample

Nmea Files

The Nmea directory contains files with an NME extension that contain data in NMEA-0183 sentence format. The GPSG-1000 is able to use GGA, RMC and GSV sentences from these files. In general the NMEA-0183 files are created by the internal or an external GPS receiver.

```
$GPGGA,150923.000,3856.4506,N,09445.2627,W,1,07,1.1,332.2,M,-30.1,M,,0000*68
$GPGSV,3,1,11,29,65,303,50,05,63,046,52,26,36,124,45,02,31,082,49*73
$GPGSV,3,2,11,25,25,230,43,15,24,164,47,21,19,285,40,12,11,198,40*7B
$GPGSV,3,3,11,10,08,049,40,30,06,321,41,18,04,230,36*40
$GPRMC,150923.000,A,3856.4506,N,09445.2627,W,0.09,154.82,290113,,,A*79
```

Figure 3. .nme File Example

The sentence structure for each position sentence:

GGA - Essential fix data which provide 3D location and accuracy data.

$GPGGA,150923.000,3856.4506,N,09445.2627,W,1,07,1.1,332.2,M,-30.1,M,,0000*68

Where:

GGA	Global Positioning System Fix Data
150923.000	Fix taken at 12:35:19 UTC
3856.4506,N	Latitude
09445.2627,W	Longitude
1	Fix quality: 0 = invalid 1 = GPS fix (SPS) 2 = DGPS fix 3 = PPS fix 4 = Real Time Kinematic 5 = Float RTK 6 = estimated (dead reckoning) (2.3 feature) 7 = Manual input mode 8 = Simulation mode
07	Number of satellites being tracked
1.1	Horizontal dilution of position
332.2,M	Altitude, Meters, above mean sea level
-30.1,M	Height of geoid (mean sea level) above WGS84 ellipsoid
(Empty field)	time in seconds since last DGPS update
0000	DGPS station ID number
*68	The checksum data, always begins with *

GSV - Satellites in View shows data about the satellites that the unit might be able to find based on its viewing mask and almanac data.

$GPGSV,3,1,11,29,65,303,50,05,63,046,52,26,36,124,45,02,31,082,49*73

Where:

GSV	Satellites in view
3	Number of sentences for full data
1	sentence 1 of 3
11	Number of satellites in view
29	Satellite PRN number
65	Elevation, degrees
303	Azimuth, degrees
50	SNR - higher is better
	Repeat PRN, Elevation, Azimuth and SNR for up to 4 satellites per sentence
*75	the checksum data, always begins with *

RMC - NMEA has its own version of essential gps pvt (position, velocity, time) data. It is called RMC, The Recommended Minimum, which will look similar to:

$GPRMC,150923.000,A,3856.4506,N,09445.2627,W,0.09,154.82,290113,,,A*79

Where:

RMC	Recommended Minimum sentence C
150923.000	Fix taken at 12:35:19 UTC
A	Status A=active or V=Void.
3856.4506,N	Latitude
09445.2627,W	Longitude
0.09	Speed over the ground in knots
154.82	Track angle in degrees True
290113	Date - 23rd of March 1994
(Empty field),,	Magnetic Variation
A	NMEA 2.3 additional field
*79	The checksum data, always begins with *

Route Files

Route files are used to populate the route table on the Route page as seen in figure 4. The files are stored and exported from the GPSG-1000 in XML format as shown in figure 5. The beginning and end of each route file is designated by the text <Route>. The body of the route consists of a number of route points with the following contents. Please note that the route data shown in figure 2 consists of six route points.

Figure 4. Route Page

<Route>

<Waypoint Longitude="-77.88420000000001" MaxAcceleration="0" MaxClimbRate="0" Name="HESKU" Latitude="37.14982222222222" Altitude="1524" TargetSpeed="53.64466666666667" TurningCircleRadius="108.5658611334349"/>

<Waypoint Longitude="-78.80005277777778" MaxAcceleration="0" MaxClimbRate="0" Name="RFLAT" Latitude="38.20028888888889" Altitude="1524" TargetSpeed="53.64466666666667" TurningCircleRadius="131.3646919714563"/>

<Waypoint Longitude="-78.83963333333332" MaxAcceleration="9.800000000000001" MaxClimbRate="-3.048" Name="RIVKE" Latitude="38.24149166666667" Altitude="1249.68" TargetSpeed="53.64466666666667" TurningCircleRadius="100"/>

<Waypoint Longitude="-78.88314444444444" MaxAcceleration="9.800000000000001" MaxClimbRate="-3.048" Name="BEEDY" Latitude="38.28670277777778" Altitude="944.88" TargetSpeed="53.64466666666667" TurningCircleRadius="100"/>

```
    <Waypoint Longitude="-78.95743055"
    MaxAcceleration="9.800000000000001"
    MaxClimbRate="-3.048" Name="RW33"
    Latitude="38.363725" Altitude="355.092"
    TargetSpeed="53.64466666666667"
    TurningCircleRadius="131.3646919714563"/>

    <Waypoint Longitude="-79.13772222222222"
    MaxAcceleration="9.800000000000001"
    MaxClimbRate="3.048" Name="MOL"
    Latitude="37.86372222222222" Altitude="1828.8"
    TargetSpeed="75.99661111111111"
    TurningCircleRadius="183.4763053155051"/>

</Route>
```

Figure 5. Route File Format

The Route data variables are formatted as follows:

Waypoint Longitude is followed by the longitude value of the waypoint in DDD.DDDDDDDD format. Values in the western hemisphere are indicated by negative values, and values in the eastern hemisphere are indicated by positive values.

MaxAcceleration is followed by the maximum acceleration value that the body in motion is allowed to achieve in the lateral and longitudinal axes as it travels from the current waypoint to the next. The acceleration value is expressed in m/s2.

MaxClimbRate is followed by the maximum climb or descent rate that the body in motion is allowed to achieve as it travels from the current waypoint to the next. The climb/descent rate is expressed in m/s.

Name is followed by the text indicating the name of the waypoint.

Latitude is followed by the latitude value of the waypoint in DD.DDDDDDDD format. Values in the southern hemisphere are indicated by negative values, and values in the northern hemisphere are indicated by positive values.

TargetSpeed is followed by the target speed of the body in motion as it passes through the waypoint. The target speed is expressed in m/s.

TurningCircleRadius is followed by the turning circle radius of the body in motion that defines the commanded path to be followed. The turning circle radius is expressed in meters.

Settings Files

The Settings file directory contains settings files generated from the GPSG-1000 File/Settings page. The Settings data is in XML format. Figure 6 is an example of the GPSG-1000 Power Up Settings. The Settings File can be edited and imported to other GPSG-1000 units to set a common start condition. Care must be taken to ensure settings parameters are compatible with the test set.

```
<!DOCTYPE GpsgPowerupConfig>

<GpsgPowerupConfig>

    <SimulationSetup>

    <SimulationMode>Gps</SimulationMode>

    <Carrier>L1_E1</Carrier>

    <SbasMode>Auto</SbasMode>

    <SimulationType>Static</SimulationType>

    <DigitalNoiseMode>Off</DigitalNoiseMode>

    <FadingMode>None</FadingMode>

    <PrnSignalType>Fixed</PrnSignalType>

    <PositionSource>User</PositionSource>

    <ClockSetting>User</ClockSetting>

    <UserDateTime>2011-08-05T21:12:16</UserDateTime>

    <UnitsType>Imperial</UnitsType>

    <LatLonFormat>DD°MM'SS.SS"</LatLonFormat>

    <RfPortSelection>Coupler</RfPortSelection>
```

```
<RfLevel>-130</RfLevel>

<RouteLooping>0</RouteLooping>

<MotionModel type="Unlimited">

  <Pedestrian LateralAcceleration="2.94"
  Velocity="10.72896"
  LongitudinalAcceleration="2.94"/>

  <Automobile
  LateralAcceleration="9.800000000000001"
  Velocity="89.408"
  LongitudinalAcceleration="9.800000000000001"/>

  <Marine LateralAcceleration="6.86"
  Velocity="44.704" LongitudinalAcceleration="6.86"/>

  <LowPerfAircraft LateralAcceleration="19.6"
  Velocity="223.52"
  LongitudinalAcceleration="9.800000000000001"/>

  <HiPerfAircraft LateralAcceleration="88.2"
  Velocity="447.04" LongitudinalAcceleration="49"/>

  <Custom LateralAcceleration="19.6"
  Velocity="0.44704"
  LongitudinalAcceleration="9.800000000000001"/>

  <Unlimited LateralAcceleration="98"
  Velocity="514.096" LongitudinalAcceleration="98"/>

</MotionModel>

</SimulationSetup>

<ChannelsSetup Gnss="12" Galileo="5" Gps="6"
SingleSbas="0" Sbas="1"/>

<IoSetup>

  <LossValues Splitter="0" Coupler="0"
  DirectCable="0" CouplerCable="0"/>

  <ExternalRefOutMode>Off</
  ExternalRefOutMode>

  <ReferenceSource>Internal</ReferenceSource>

  <TriggerMode>Auto</TriggerMode>

</IoSetup>

<DefaultStaticPoint Longitude="0" Latitude="0"
Altitude="0"/>

<DefaultFiles Trajectory="" Route="Default Route"
Almanac=""/>

<DiagnosticsSetup>

  <DiagnosticsMode>Off</DiagnosticsMode>

  <Frequency>1176.45 MHz</Frequency>

  <Amplitude>-100</Amplitude>

  <DopplerError>0</DopplerError>

</DiagnosticsSetup>

</GpsgPowerupConfig>
```

Figure 6. Settings File Example

Waypoint Files

The Waypoint file directory contains user entered custom waypoints created on the waypoint page. The Waypoint data is in CSV format. The Waypoint files will open in Excel. Figure 7 is an example of the Waypoint csv file.

A	B	C	D	E	F	G	H	I	J
NY to RM 01	NA		TR01	NA	49.0875	-45.3539	7000	0	**0**
MY to RM 02	NA		TR02	NA	49.82806	-19.7547	7000	0	**0**

Figure 7. Waypoint FIle Example

Where:

Column A — An unique name the user assigns to each user Waypoint.

Column B — City. In this case the Waypoint is not in a city.

Column C — Country, not currently used.

Column D — Unique code to each user Waypoint. GPSG-1000 can sort Waypoints by this code.

Column E — ICAO Code. A four-character code designating each airport around the world. In this case the Waypoint is not an airport.

Column F — Latitude

Column G — Longitude

Column H — Altitude (in this case expressed in ft)

Column I — UTC offset, not currently used.

Column J — This column is added when the Waypoint file is edited to insert a comma at the end of the sentence. 0 should be entered here.

VIAVI Solutions

Contact Us: +1 316 522 4981
avcomm.sales@viavisolutions.com

To reach the VIAVI office nearest you, visit viavisolutions.com/contact

GPSG1000FilePropertiesAndFormats-an-avi-nse-ae
30191265 900 1020