

**GUHR**

**GEOMLIB (β)**

**MARINE ENGINEERING GEOPHYSICAL  
DATA PROCESSING TOOLBOX**

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# 1 gUhr general description

MatLab functions set for manipulations Digital Seismic (High Resolution, Ultra High Resolution) data. Today set includes functions for reading Logs from GeoEel, MultiTrace seismic stations and GunLink2000 controller. The Logs-data used for streamer-guns geometry calculation.

The set's functions are shown in *Table 1*.

*Table 1* gUhr functions

Function name	Function description
<b>GeoEel (Geometrics) seismic station</b>	
gUhrGeoEel_NavLogRead	Read Navigation log
<b>GunLink2000 (SeaMap) gun controller</b>	
gUhrGunLink2000_LogRead	Read Gun-log
<b>Multi-Trace (GEO Marine Survey Systems) seismic station</b>	
gUhrGeoSense_NavLogRead	Read Navigation log
gUhrGeoSense_StreamerLogRead	Read Station log
gUhrGeoSense_DirRenameShotId2FFID	Rename SEG-D from SHOTID to FFID

## 1.1 Multi-Trace (GEO Marine Survey Systems) seismic station

The navigation's messages, sends to Multi-Trace (GEO Marine Survey Systems) seismic station's software. In the navigation message, the coordinates of the seismic source tow point (or seismic source) are transmitted. The message format is:

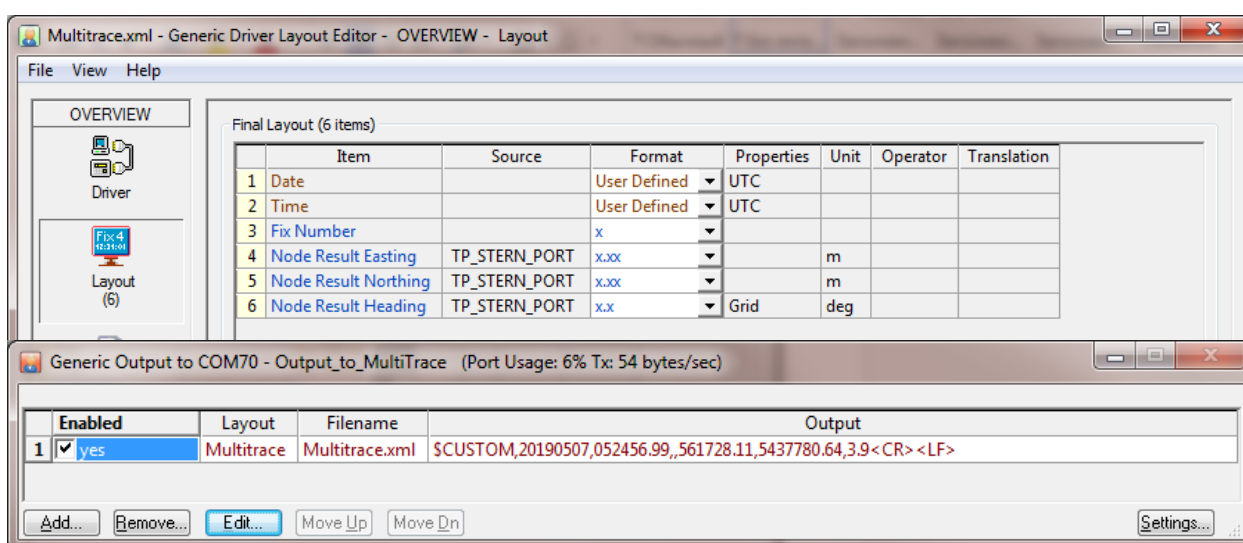
`$CUSTOM,YYYYMMDD,HHMMSS.SS,Fix,XXXXXX.XX,YYYYYYY.YY, Head<CR><LF>`

Where:

YYYYMMDD – date; HHMMSS.SS – time; Fix – number fix;

XXXXXX.XX – Easting; YYYYYYY.YY – Northing; Head – heading (ship's course).

The QINSy settings are shown in *Figure 1*.



*Figure 1* QINSy settings for \$CUSTOM message to Multi-Trace

The Multi-Trace station's software configuration-window for navigation message is shown in *Figure 2*. In a practice, we have a bad result when try to use fields: Speed, Date, Time showed in *Figure 2* (probably, it is some bug with current software version). So, to Longitude/Easting field sends Easting; to Latitude/Northing field sends Northing; to Fix field sends Fix; **to Heading field sends Time**.



*Figure 2* Multi-Trace station's configuration-window for navigation message

The Station Log-file (function gUhrGeoSense\_StreamerLogRead) is used for shot's information creation; the main information takes from Station Log-file is **GpsTime, Fix, FFID, SHOTID and calculated GpsDay**. The Navigation log (function gUhrGeoSense\_NavLogRead) usually is not used.

If you write data to Seg-d, than SHOTID is used with file name; it can be renamed to FFID with function gUhrGeoSense\_DirRenameShotId2FFID. Compare Fix and FFID, from Station Log-file we can find over-shots, miss-shots and link own [GpsDay, GpsTime] to each FFID.

If you use QINSy software, than GpsTime, was send with message, is true. But Easting and Northing are not true; the coordinates sends from "previous second"... so, if shot's GpsTime is 02:02:02.589 than coordinates sends for Time 02:02:02. It is recommend to use additional file exported from QINSy with 1 second step and find Easting and Northing with coordinates interpolation to true GpsTime.

If you create P1/90, using QINSy software in post-processing, than Easting and Northing are true.

## 1.2 GeoEel (Geometrics) seismic station

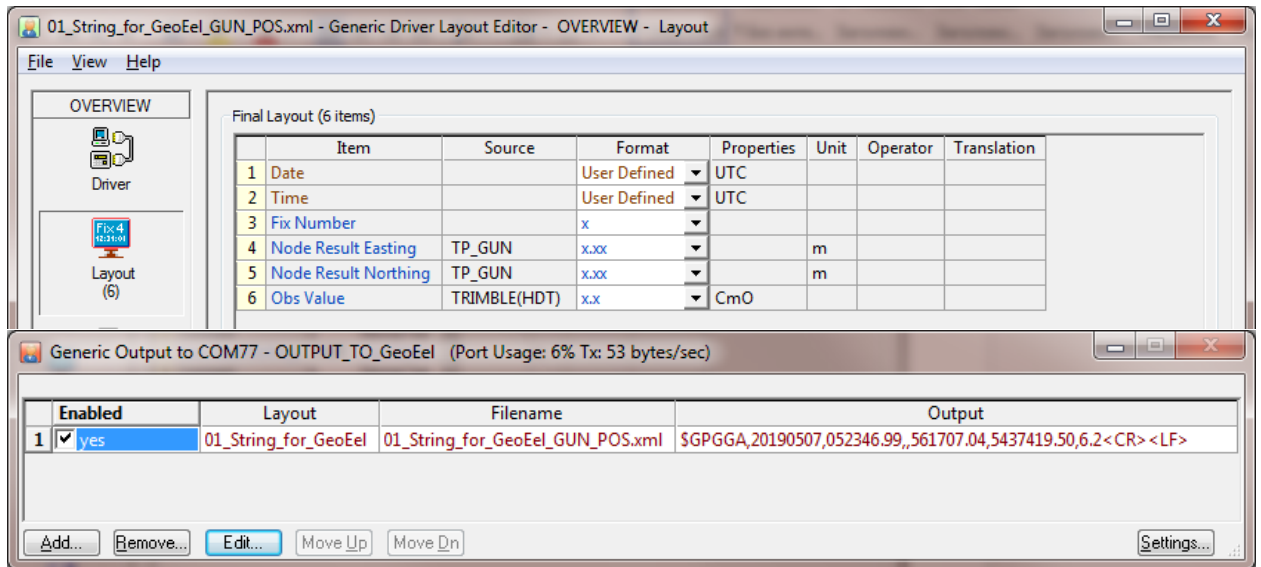
The navigation's messages, sends to GeoEel (Geometrics) seismic station's software. In the navigation message, the coordinates of the seismic source tow point (or seismic source) are transmitted. The message format is:

\$GPGGA, YYYYMMDD,HHMMSS.SS,Fix,XXXXXX.XX,YYYYYYYY.YY, Head<CR><LF>

Where:

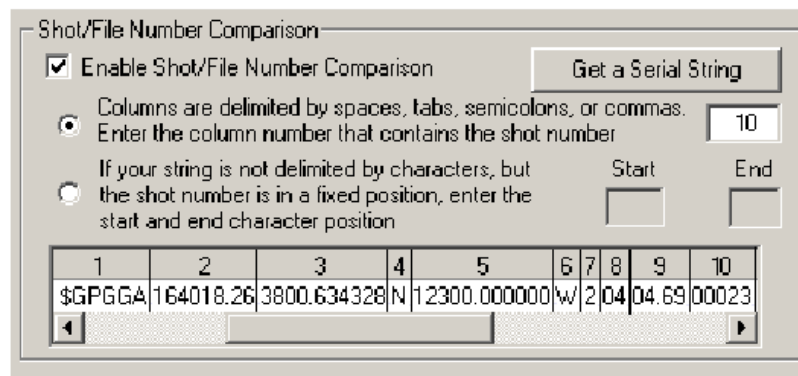
YYYYMMDD – date; HHMMSS.SS – time; Fix – number fix;  
 XXXXXX.XX – Easting; YYYYYYY.YY – Northing; Head – heading.

The QINSy settings are shown in *Figure 3*.



*Figure 3* QINSy settings for \$CUSTOM message to GeoEel

The Multi-Trace station’s software configuration-window for navigation message is shown in *Figure 2*. The Navigation Log-file (function gUhrGeoEel\_NavLogRead) is used for shot’s information creation; the main information takes from Station Log-file is **GpsDay**, **GpsTime**, **Fix**, **SHOTID** (**SHOTID == FFID**).



*Figure 4* GeoEel station’s configuration-window for navigation message

If you use QINSy software, than GpsTime, was send with message, is true. But Easting and Northing are not true; the coordinates sends from “previous second”... so, if shot’s GpsTime is 02:02:02.589 than coordinates sends for Time 02:02:02. It is recommend to use additional file exported from QINSy with 1 second step and find Easting and Northing with coordinates interpolation to true GpsTime.

If you create P1/90, using QINSy software in post-processing, than Easting and Northing are true.

### **1.3 GunLink2000 (SeaMap) gun controller**

The GunLog's entry is depends from GunLink2000 configuration. The gUhrGunLink2000\_LogRead function includes follow configuration:

- 1) 4 guns;
- 2) Atmospheric pressure sensor;
- 3) DepthSensor (pressure sensor installed to seismic cluster);
- 4) LinePressureSensor (pressure to guns).

For another configurations gUhrGunLink2000\_LogRead function need to be to supplement.

## 2 Multi-Trace (GEO Marine Survey Systems) seismic station

### 2.1 Read Navigation log

**function out=gUhrGeoSense\_NavLogRead(fName,key,varargin)**

Read Navigation log was created Multi-Trace Data Acquisition software (GEO Marine Survey Systems) for MultiTrace station. The station's input message from navigation is \$CUSTOM

Parameters:

fName – name of file with Navigation log data from MultiTrace station software (RAW\_LOG-Input 0.log);

key – the key for navigation message format;

varargin – divider for GpsTime;

out – output structure, depends from key;

===== **if key==1, then:**

1) out fields are: fName,GpsDay,GpsTime,FIX,GpsE,GpsN,Heading,Depth.

2) Input file format example:

```
$CUSTOM,20170906,221035.94,453,513681.21,8006048.81,50.16
```

```
$CUSTOM,20170906,221037.65,454,513684.02,8006051.09,49.86
```

where 20170906- date by Gps; 221037.65- time by Gps; 454- fix number; 513684.02- easting; 8006051.09- nording; 50.16- heading.

Function Example:

```
>> out=gUhrGeoSense_NavLogRead('c:\temp\Day1\RAW_LOG-Input 0.log',1);
```

### 2.2 Read Station log

**function Log=gUhrGeoSense\_StreamerLogRead(fName,varargin)**

Read data from Station Log-file was created Multi-Trace Data Acquisition software (GEO Marine Survey Systems) for MultiTrace station.

WARNING!!! There is hint >> VESSEL\_HDG contained GpsTime.

Parameters:

fName – reading file name;

varargin – divider for GpsTime;

Log – output structure, includes: FFID, SHOTID, LINE, SN, TS, CompDay, CompTime1, GpsE, GpsN, FIX, GpsDay, GpsTime, CompDay2, CompTime2.

Log file format example:

```
FFID,455, SHOTID,6621, LINE,130, SN,18661018, TS,800.0, 25/08/2017 12:55:24.203  
UTC,VESSEL_X,648047.970000000, VESSEL_Y,8163329.690000000, VESSEL_FIX,455.000000000,
```

VESSEL\_HDG,125510.220000000, VESSEL\_AZI,0.000000000, VESSEL\_FEA,0.000000000,  
VESSEL\_SPEED,393308.209639116, VESSEL\_GPSTIME,25/08/2017 12:55:24.166 UTC,

Function Example:

```
>> out=gUhrGeoSense_StreamerLogRead('c:\temp\Day1\18661018.log');
```

### 2.3 Rename SEG-D from SHOTID to FFID

**function flOut=gUhrGeoSense\_DirRenameShotId2FFID(DirName,fLogName)**

Rename Seg-d files in DirName, named by SHOTID to FFID. Get data from Station Log-file was created Multi-Trace Data Acquisition software (GEO Marine Survey Systems) for MultiTrace station.

Parameters:

DirName – folder with Seg-d files, named using SHOTID;

fLogName – Log-file name, will used to create structure with fields: FFID, SHOTID, LINE, SN, TS,

CompDay, CompTime1, GpsE, GpsN, FIX, GpsDay, GpsTime, CompDay2, CompTime2;

Log file format example >>

```
FFID,455, SHOTID,6621, LINE,130, SN,18661018, TS,800.0, 25/08/2017 12:55:24.203  
UTC,VESSEL_X,648047.970000000, VESSEL_Y,8163329.690000000, VESSEL_FIX,455.000000000,  
VESSEL_HDG,125510.220000000, VESSEL_AZI,0.000000000, VESSEL_FEA,0.000000000,  
VESSEL_SPEED,393308.209639116, VESSEL_GPSTIME,25/08/2017 12:55:24.166 UTC,
```

Function Example:

```
>> flOut=gUhrGeoSense_DirRenameShotId2FFID('c:\temp\Day1\18661018\');
```



### 3 GeoEel (Geometrics) seismic station

#### 3.1 Read Navigation log

**function out=gUhrGeoEel\_NavLogRead(fName,key)**

Read Navigation log formed GeoEel (Geometrics) station software. The station's input message from navigation is a string similar \$GPGGA (not in NMEA spec.)

Parameters:

fName – name of file with Navigation log data from GeoEel;

key – the key for navigation message format;

out – output structure, depends from key;

===== **if key==1, then:**

1) out fields are: fName, CompTime, GpsTime, GpsLat, GpsLon, GpsFixQuality, GpsSatNum,GpsHorizDilution, EchoDepth, FIX, SHOTID.

2) Input file format example:

File: 101, \$GPGGA,22243766,1540.2444444,N,10926.7777777,E,2,16,0.70,216.6,102, 22:24:56.15

===== **if key==2, then:**

1) out-fields are: fName,CompTime,GpsDay,GpsTime,GpsE,GpsN,Heading,FIX,SHOTID.

2) Input file format example:

File: 1000, \$GPGGA,20190307,120310.58,1000,666396.45,5803185.78,28.2, 23:03:22.49

Function Example:

```
>> out=gUhrGeoEel_NavLogRead('c:\temp\Day1\TEST.Nav.txt',2);
```

## 4 GunLink2000 (SeaMap) gun controller

### 4.1 Read Gun-log

**function out=gUhrGunLink2000\_LogRead(fName,key)**

Read Gun-log from GunLink2000 station software.

Parameters:

fName – name of file with GunLink2000 log data;

key – the key for guns cluster format;

out – output structure, depends from key;

===== **if key==1, then:**

1) The guns cluster includes: 4\_guns + AtmReff + DepthSensor + LinePressureSensor

2) out fields are: fName, LineName, Title, GpsDay, GpsTime, FIX, G1Err, G2Err, G3Err, G4Err,  
AtmReff, GunDepth, GunPress, GunVol

3) Input file format example:

Line: 0005\_C\_L\_HR\_18

```
SHOTPOINT AIM_POINT_TIME String_1-Cluster_1-Gun_1 String_1-Cluster_1-Gun_2 String_1-
Cluster_1-Gun_3 String_1-Cluster_1-Gun_4 _Atmospheric_Ref_ String_1_DT_1_
_Main_Manifold_ VOLUME
```

```
000001001 2019-06-09_19:02:04.182081 7.0 0.0 0.0 2.0 1010.00 3.59 2180 160
```

```
000001002 2019-06-09_19:02:06.996750 1.0 0.0 1.0 1.0 1009.50 3.51 2156 160
```

Function Example:

```
>> out=gUhrGunLink2000_LogRead('d:\001_RawData\0005_C_L_HR_18_GunLog.txt',1);
```

### **Citation**

- 1) Multi-Trace Data Acquisition software // User manual rev. 1.4, Created on: 2014-05-11, Last modified: 2016-05-04 By Sergio Monteleone // Copyright GEO Marine Survey Systems.
- 2) GEOEEL DIGITAL STREAMER // OPERATION AND REFERENCE MANUAL 26504-01 Rev. K, Software Version 5.41 // Geometrics Inc.