Accelerometer. Determination of Strike and Incline

User Manual

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Necessary Tools, Devices, Materials

1. The Galileosky satellite monitoring tracking device (hereinafter – tracking device) of one of versions. Detailed manual for the tracking device’s connection and setting can be found in following the link: https://galileosky.com/podderzhka/dokumentacziya.html

2. Windows-based computer with the installed service program of configuration of tracking devices – “Configurator”. You can download it here https://galileosky.com/podderzhka/programmyi.html
General Information

Each Galileosky tracking device is equipped with the accelerometer, which allows to support a number of functions:

1. to determine the tracking device’s orientation in space;
2. to filter «coordinates crowding» at stops on the basis of the vehicle vibration;
3. to determine the tracking device’s strike and incline.
Determination of Strike and Incline

All devices Galileosky enable to determine the tracking device strike and incline. This functionality allows to set critical values of strike and incline, which can be accident or other emergencies indicators of a vehicle. In case of such indicators recording, the tracking device warns about it by means of SMS, phone call, photo or sending messages to the monitoring server.

Strike is considered as the exceedance of specified acceleration threshold in a horizontal plane, and the tenth bit will be set in the device status field. By the exceedance of maximum incline angle, the first bit will be set in device status field. Full interpretation of device status fields is mentioned in Table 1 of the Addendum №1 to the current document.

For functions setting of strike and incline determination, it is necessary to make the following sequence of actions:

1. **Set thresholds of strike and incline determination**

For strike determination, it is necessary to make the following sequence of actions:

a) install the tracking device in such a way that one of the accelerometer axes is positioned vertically, it will allow to avoid false responses on road bumps. There is an example of the tracking device`s installation in Pic. 1;

b) go to «Settings» tab -> «Signaling» of «Shock and roll detection» section in the Configurator (Pic.2);

c) choose operation mode in «Mode» field;

Pic. 1
Example of the tracking device installation
d) specify maximum incline angle and allowable exceedance time of this angle;  
e) specify minimum strike acceleration, the less the value, the higher sensitivity (600 units =  
acceleration of gravity, \( g \)).

ATTENTION! After executing settings, it is obligatory to reset the tracking device so that  
changes become operational.

By the configured mode of the strike and incline determination, the tracking device will  
record an additional point by the exceedance of specified values.

2. **Set signaling activation by strike and (or) incline**

If necessary, switch the tracking device to the alarm mode by the detection of tracking  
device`s strike and (or) incline, send SMS message or make a call to the predefined phone  
number or take a photo, one should set the tracking device`s signaling mode.

For signaling setting for tracking device`s strikes and inclines, it is necessary to make the  
following sequence of actions:

a) launch the Configurator and go to «Settings» tab -> «Signaling»;

b) choose «Mode» (for example, «roll enables alarm») in «Shock and roll detection in  
signaling mode» section, choose notification type and enter the message text if it is  
necessary (Pic. 3);

c) set «Maximum time in alarm» field (Pic. 4);

d) press «Apply» button;

e) go to «Protocol» tab and tick «Status of device» field in settings of the main packet (Pic. 5);
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(version 4 dated April 9, 2018)

3. **Check the availability of alarm messages in the monitoring software**

For checking the availability of alarm messages in the monitoring software, it is necessary to make the following actions:

a) make sure that the signaling mode is activated on the tracking device. For this purpose, send «ST» command on «Commands» tab of the Configurator (Pic. 7);
b) simulate the situation, in which one of the critical values of strike and (or) incline is exceeded, for example, incline the tracking device for more than 20°;

c) go to «Messages» tab in the monitoring software, specify unit and parameters for the report generation (Pic. 8):

- unit;
- time interval;
- choose «Data messages» in «Message type» field;
- specify «Raw data» in «Show parameters as» field;

click «Execute» button.

d) check the availability of alarm messages in the monitoring software (Pic. 9).
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Information about strike and/or incline is transmitted in the device status to the monitoring software (see bits 10 and 1 of the Addendum №1). If necessary, it is possible to create a strike or incline sensor, which decrypts this information from the device status in the monitoring software. Let us consider the example of the sensor creation in Wialon monitoring software.

For the sensor creation, make the following actions:

1. go to Properties tab in the monitoring software;
2. go to «Sensors» tab and press «New» button (Pic.10);

3. specify necessary parameters in Sensor properties window (Pic.11):
   - enter sensor name;
   - choose sensor type as «Custom digital sensor»;
   - enter out27 in «Parameter» field, if it is necessary to create a strike sensor, or out18, if it is necessary to create an incline sensor.

4. Specify «Sensor values» in «Show parameters as» field to observe sensors messages from the unit and press «Execute» button.
Setting of accelerometer parameters is finished, the tracking device is ready to operate.

RSA “Galileosky”, LLC produces satellite monitoring equipment for GPS and GLONASS real time vehicles monitoring. The tracking devices determine the mobile object location recording the time and route as points with geographical coordinates and send the data to the server to be further processed and sent to the traffic controller panel.

In addition, a number of other vehicle parameters are recorded: the state of analog and discrete inputs of the tracking device and the state of digital interfaces.

The tracking devices can be used in any vehicle.
### Appendix №1

**Interpretation of device status field**

**Table 1. Interpretation of device status field**

<table>
<thead>
<tr>
<th>Bit number</th>
<th>Field explanation</th>
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<tr>
<td>0</td>
<td>0 – vibration level corresponds to a stop; 1 – motion (is set by AccSens command).</td>
</tr>
<tr>
<td>1</td>
<td>0 – incline angle does not exceed the allowable one; 1 – incline angle exceeds the allowable one.</td>
</tr>
<tr>
<td>2</td>
<td>0 – no one of trusted iButton keys is connected; 1 – one of trusted iButton keys, stored on microSD-card, is connected.</td>
</tr>
<tr>
<td>3</td>
<td>0 – there is a SIM-card; 1 – GSM-modem does not identify SIM-card.</td>
</tr>
<tr>
<td>4</td>
<td>0 – tracking device is out of geofence; 1 – tracking device is within geofence.</td>
</tr>
<tr>
<td>5</td>
<td>0 – voltage across internal source is normal; 1 – lower than 3.7 V.</td>
</tr>
<tr>
<td>6</td>
<td>0 – GPS-aerial is connected; 1 – disconnected.</td>
</tr>
<tr>
<td>7</td>
<td>0 – voltage across internal power bus of Tracking device is normal; 1 – varies from standard.</td>
</tr>
<tr>
<td>8</td>
<td>0 – external power supply voltage is normal; 1 – varies from standard (is set by powincfg command).</td>
</tr>
<tr>
<td>9</td>
<td>0 – vehicle is stopped; 1 – vehicle is started (is set by mhours command).</td>
</tr>
<tr>
<td>10</td>
<td>0 – vibration level corresponds to normal driving; 1 – vibration level corresponds to strike.</td>
</tr>
<tr>
<td>11</td>
<td>0 – GPS operates; 1 – GLONAS unit operates.</td>
</tr>
<tr>
<td>12</td>
<td>Signal quality, range: [0-3]. The less, the worse the connection.</td>
</tr>
<tr>
<td>13</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>0 – signaling mode is off; 1 – on.</td>
</tr>
<tr>
<td>15</td>
<td>0 – no alarm; 1 – alarm is activated.</td>
</tr>
</tbody>
</table>