RS485. Integration with Tachograph “Mercury TA-001”

User Manual
Contents

Necessary Tools, Equipment and Materials ........................................ 3
General Information .............................................................................. 4
Connecting Tachograph “Mercury TA-001” via RS485 Interface .............. 6
Monitoring Software Setting ................................................................. 9
APPENDIX № 1 .................................................................................. 10
Necessary Tools, Equipment and Materials

To connect tachograph “Mercury TA-001” (hereinafter - tachograph) to Galileosky tracking device (hereinafter – tracking device), you should have:

1. Electrical-installation tools.
2. A set of connecting wire.
3. A computer with Windows-based operating system and an installed configuration program for Galileosky tracking devices— «Configurator 4.0» or a more advanced version. It is recommended to install the last version from the site https://galileosky.com/podderzhka/programmyi.html
General Information

Tachograph “Mercury TA-001” – is a test and measurement device for registration vehicle mileage, speed limits and periods of drivers’ work and rest. Tachograph (Pic. 1) is required for monitoring observance of traffic rules and established regime of driver’s work. That is aimed at preventing road accidents.

Tracking device provides the following functions:

1. Displays the current mode of the tachograph:
   1.1. flags of tachograph state;
   1.2. trip distance;
   1.3. information on the first and second driver:
       1.3.1. current activity;
       1.3.2. card type;
       1.3.3. card number.
2. Uploading ddd-file from the driver’s card.

ATTENTION! Such functionality is implemented in the tracking devices by means of Easy logic technology (https://galileosky.com/products/easylogic.html). It is necessary to use tracking devices with support of Easy Logic. You can find out whether the tracking device supports Easy Logic or not in the following ways:

- in tracking device’s specification there should be abbreviation (Al) or sticker on the back of the device should have abbreviation (2) near IMEI (Pic. 2).
- send Hardversion command to the tracking device, if you receive numbers different from zero after comma in response, algorithms are supported (example of reply: HARDVERSION=21,8243)
To work with tachograph “Mercury TA-001” minimal firmware version for Galileosky v.5.X, v.4.0 tracking devices should be 230.5 or higher. Galileosky Base Block and 7.0 can cooperate with the tachograph with any firmware version installed.
RS485. Integration with Tachograph “Mercury TA-001”  
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Connecting Tachograph “Mercury TA-001” via RS485 Interface

Connecting tachograph to the tracking device is carried out in accordance with the scheme shown in Picture 3.

**ATTENTION!** Before connecting tachograph to a tracking device, make sure, that tachograph has not less than 1.04.0223 version of firmware.

**ATTENTION!** Grounds (GND) of the tracking device and tachograph must be connected! Power supply is provided separately.

Tracking device settings for tachograph connection are carried out via Configurator:

1. connect tachograph to the tracking device;
2. connect the tracking device to PC;
3. run Configurator program on PC;
4. go to “Settings”, tab “Track”, set dynamic structure of archive storage (Pic.4);
RS485. Integration with Tachograph “Mercury TA-001”
(version 4 dated from August 8, 2018)

**ATTENTION!** For tracking devices Galileosky Base Block and 7.0 versions the setting of dynamic structure mode is not needed.

5. go to tab “Settings” -> “Protocol” and tick “User array” of the main packet (Pic. 5);

![Pic. 5](image_url)

Main packet setting

6. go to tab “Digital inputs”, set value “Photocamera (legacy version)” or “Photocamera and FLS, dozometer DBG-S11D” for “RS485 peripheral type” parameter (Pic. 6);

![Pic. 6](image_url)

Setting RS485 peripheral type

7. apply settings by clicking “Apply” button;

8. go to tab “Commands” in Configurator, run “script galileosky/tahograf_mercury” command (Pic. 7);

![Pic. 4](image_url)

Dynamic archive structure mode setting

![Pic. 7](image_url)

Dynamic archive structure mode setting

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ATTENTION! Algorithm is downloaded from the server, that is why SIM-card should be installed and GPRS-connection should be established on the tracking device.

9. go to Device tab and check the Easy Logic parameter and make sure it includes information on the algorithm (Pic. 8);

10. to check algorithm operating go to tab “Troubleshooting” in Configurator, tick “Algorithm and script diagnostics” parameter and check troubleshooting messages (Pic. 9);

As a result, you will receive lines with prefix “Taho”:

- “Taho no response” means, that device doesn’t reply;
- “Taho driver1 activity” means, that tachograph responses. Number is a current activity of the first driver.
Monitoring Software Setting

After you set-up the tracking device, there is setting-up of monitoring software.

**ATTENTION!** Completion of software to retrieve ddd-files from tachograph through the tracking device is already made in monitoring system Wialon Hosting (pic. 10). To get data analysis of ddd-files, you should use application TachoManager:

http://apps.wialon.com/docs/ru/tachomanager.html and TachoView:


If your software does not support receiving information from tachograph through Galileosky tracking device, you should individually develop and install software to the monitoring server, processing data in accordance with the protocol of exchange between the tracking device and server. There is protocol description in Appendix №1.

Connecting tachograph “Mercury TA-001” to Galileosky tracking device is completed, the tracking device is ready for use.

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

Instruction on developing monitoring server software for operating with tachograph “Mercury TA-001”

Display of current status of the tachograph

- Current tachograph status is requested by the tracking device every 30 seconds;
- Data are saved in GalileoSky protocol tag – User array;
- Size of saved data – 58 bytes;
- Field, ticked as “not supported”, are transmitted, but they don’t contain valid data;
- Format of saved data (bytes order - little-endian):

<table>
<thead>
<tr>
<th>Field name</th>
<th>Size in bytes</th>
<th>Description</th>
</tr>
</thead>
</table>
| data_type   | 1             | Data type:  
|             |               | 0x03 – tachograph data |
| taho_type   | 1             | Tachograph type:  
|             |               | 1 – SHTRIH-Taho RUS   
|             |               | 2 – Atol Drive 5         
|             |               | 3 – Mercury TA-001       |
| taho_state  | 1             | status of connection to a tachograph (not supported) |
| mode        | 1             | current tachograph status (not supported) |
| speed       | 1             | vehicle speed, km/h (not supported) |
| trip        | 4             | trip distance, 0,1 km |
| flags       | 1             | flags of tachograph status:  
|             |               | bit 0 – start      
|             |               | bit 1 – switchable mass (for ADR)  
|             |               | bit 2 – special status “crossing/train”   |

Parameters of driver 1 (24 bytes)

<table>
<thead>
<tr>
<th>Field name</th>
<th>Size in bytes</th>
<th>Description</th>
</tr>
</thead>
</table>
| activity    | 1             | current activity:  
|             |               | 0 – rest,  
|             |               | 1 – readiness,  
|             |               | 2 – work,  
|             |               | 3 – driving. |
| card_type   | 1             | card type:  
|             |               | 0 – no card   
|             |               | 1 – driver’s card      
|             |               | 2 – manufactory card          
|             |               | 3 – inspector card            
|             |               | 4 – company card             
|             |               | 5 – “not driver” card         |
| activity_time | 2              | Time in current mode (in minutes) (not supported) |
RS485. Integration with Tachograph “Mercury TA-001”
(version 4 dated from August 8, 2018)

<table>
<thead>
<tr>
<th>Field name</th>
<th>Size in bytes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>driving_time</td>
<td>2</td>
<td>Accumulated driving time per day (in minutes) (not supported)</td>
</tr>
<tr>
<td>restless_time</td>
<td>2</td>
<td>Time of continuous driving since the last rest (in minutes) (not supported)</td>
</tr>
<tr>
<td>card_number</td>
<td>16</td>
<td>Card number</td>
</tr>
<tr>
<td>activity</td>
<td>1</td>
<td>Parameters of driver 2 (24 bytes) (see “parameters of driver 1”)</td>
</tr>
<tr>
<td>card_type</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>activity_time</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>driving_time</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>restless_time</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>card_number</td>
<td>16</td>
<td></td>
</tr>
</tbody>
</table>

Uploading the driver’s card

Uploading the card is run by the server. Receiving requests from the server, the tracking device reads file of uploading driver card from tachograph and sends it to the server. Operation can take a long time.

- The server sends commands to the tracking device in tag 0xE1 (text):
  - see below “Server Commands”;
  - tracking device transmits commands to the tachograph;
- The tracking device sends responses to the server in tags 0xE1 (text), 0xEB (binary data):
  - see below response’s format (text) and binary data.

You can read description of tracking device-server exchange protocol in Galileosky protocol, which you can find in our site in the tabs Support -> User manuals -> Galileosky Protocol -> “Server exchange protocol of Galileosky tracking devices” (https://galileosky.com/podderzhka/dokumentaciya.html).

Logic of server’s work

Server requests a part of uploading file (Pic.11). If tachograph returned it to the tracking device, it will send this part to the server without changes, otherwise, error 03 will return - error of file uploading.

**ATTENTION!** Formation of the responses of both commands can take a long time

- Server needs to wait for the response for 1 minute;
- If no response is received, it is necessary to repeat the request.
RS485. Integration with Tachograph “Mercury TA-001”
(version 4 dated from August 8, 2018)

Server commands

1) A request to form a driver’s card uploading file

TAHOPREPARE <slot_number>

You should specify driver’s slot number: “1” - for the first and “2” - for the second. There are no binary data in response.

2) Request for prepared uploading file in parts

TAHOFILE <chunk_number>

- You should specify block number;
- The block size is always 242 bytes;
- File size - ~ 27Kb;

Response contains binary data, if the requested part of the uploading file is received from the tachograph;

If there is a request for the last part of uploading file, the length of the binary data will be in the range [0,242] bytes.

3) Request for authentication key installation. Attention, his command is for correspondence of the protocol with other tachographs. 00 will always be returned in reply, it means, command is successfully completed. There are no binary data in response.

TAHOKEY <auth_key>

Tracking device’s answers (tag 0xE1)

- TAHO <answer_code>
RS485. Integration with Tachograph “Mercury TA-001”  
(version 4 dated from August 8, 2018)

Answer codes:

- **00** – command is successfully completed;
- **01** – tracking device is not authorized;
- **02** – card is not installed, or wrong type of a card is installed;
- **03** – error in uploading file;
- **04** – incorrect parameter.