



# NEOMATICA

## Telematic terminal ADM700 3G GLONASS/GPS-GSM/GPRS

Operation manual

Edition 1.2



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This Operation manual relates to the tracker ADM700 3G (hereinafter referred to as tracker) and describes the procedure of its installation and connection as well as its function and settings.

The Operation manual is designed for professionals who have familiarized themselves with the rules of repair and installation works execution in vehicles and who have special professional knowledge in electronic and electric equipment used on various transport means.

The tracker proper work can be guaranteed if it is installed and set by qualified professionals. To use the tracker properly it is necessary to familiarize with the monitoring system work principles in general and to understand the function of all its components. For this reason, it is strictly recommended to get basic knowledge on GLONASS and GPS global navigation satellite systems functioning, GSM network, issues related to data transmission by means of short message service (SMS), GPRS and Internet.

# 1 Application and operation principles

The tracker (see Figure1) is designed for being installed on a vehicle as an extra device identifying the vehicle location, speed, travel direction. The exterior of the tracker is shown on the Figure 1.



Figure1 — General view of the tracker

In addition, it records a number of vehicle parameters such as: analogue and discrete inputs condition and readings from sensors. Similarly, the tracker allows managing external equipment by means of discrete outputs and with commands received via GPRS or SMS. All the events and conditions recorded by the tracker are stored in its non-volatile memory.

The accumulated data are transmitted through a mobile operator network of GSM 850/900/1800/1900 standard by means of GPRS batch data transmission to a dedicated server with static IP-address or domain name, which these data might be received from through the Internet for further analysis and processing in the operator's console.

The tracker allows establishing voice-connection. When there is an incoming call, the tracker answers it automatically and establishes voice-connection allowing talking to the driver. To implement this feature it is necessary to connect a headset or a microphone with a loudspeaker to the tracker

The tracker might be set by any appropriate method: locally (via USB interface using the configuration program) or remotely (by means of commands sending via SMS or GPRS).

To secure data integrity while switching the power off and loosing the GSM signal the tracker is equipped with the non-volatile memory. For the autonomous work the device is equipped with an inner battery. The working time with the completely charged battery is 3 hours in the full-featured mode and 2 extra hours in the data saving mode. The working time may change

depending on the GSM connection condition. Data transmission is possible only if there is a mobile connection signal of the GSM 850/900/1800/1900 standard supporting the packet data transmission (GPRS).

The vehicle travel route is described in the form of separate points in time where all the information coming to the tracker from inner sensors and extra equipment is recorded. The route point is saved when at least one event occurs, such as:

- travel direction changes by an angle which is greater than the pre-set one;
- the straight-ahead travel is performed at a distance, which is longer than the pre-set one;
- the pre-set acceleration limit is broken;
- the time for putting the point while traveling (parking) is expired;
- device status change (see the Appendix A);
- an event occurs in analogue and/or discrete inputs.

In this way, route points might be saved with the time interval from one second to several minutes allowing for a quality routing, recording any changes without a surfeit of information saved in the “black box” and increase in GPRS traffic.

The tracker with the GLONASS/GPS module ensures time and navigation parameters measuring based on GLONASS and/or GPS satellites. After being connected to the power supply, the tracker starts receiving data from satellites, locating itself, identifying speed, time, measuring voltage in inputs and connecting to the server. After being connected to the server, the tracker transmits thereto the data packets with the pre-set frequency or when an event occurs. If for any reason the connection to the server fails, all the information will be saved in the tracker non-volatile memory and transmitted as soon as the connection is restored.

**Data transmitted by the tracker:**

- GMT date and time;
- coordinates (latitude, longitude, altitude);
- speed, acceleration and travel direction;
- number of satellites when fixing a navigation problem;
- precision loss factor in a horizontal plane;
- voltage values in analogue inputs;
- values from pulse inputs;
- data about events occurred;
- data from connected sensors;
- discrete outputs condition;
- device condition (see the Appendix A).

If allowed by settings, when there is an incoming call, the tracker establishes voice connection. During the voice connection data transmission via GPRS is paused and after the first is finished, the latter will be re-initiated.

## 2 Technical features

— GLONASS/GPS receiver:

chipset: MT3333 (MediaTek);

frequency band: GLONASS – L1 (CT-code), GPS - L1 (C/A code);

sensitivity in cold start/tracking: -148 dBm/-161dBm;

number of tracking/picking-up channels: 33/99;

positioning precision, 95% of time, not worse: 3 m

— Connection standard:

GSM 850/900/1800/1900/2100, GPRS/EDGE Multi-slot Class 12/HSDPA 3GPP release 5

— GSM transmitter power: 2 W

— Number of SIM-cards: 2 or 2 SIM-chips (optional)

— Number of analogue inputs: 6

— AIN0 analogue input features:

voltage measurement range 0-6,6V

discreteness (sensitivity) 6 mV.

minimum input resistance 110 kilo-Ohm

— AIN1 analogue input features:

voltage measurement range 0-13,3V.

discreteness (sensitivity) 13 mV.

minimum input resistance 110 kilo-Ohm

— AIN2...AIN5 analogue inputs features:

voltage measurement range 0-36,6V.

discreteness (sensitivity) 36 mV.

minimum input resistance 110 kilo-Ohm

— Number of discrete (pulse) inputs: 2

— Discrete (pulse) inputs features:

operation mode: frequency meter, flowmeter (counter), discrete;

maximum frequency: 3000 Hz;

maximum quantity of pulses counted: 4294967295;

activation by connection to the ground;

inner pull-up to the plus

- Number of “open collector” discrete outputs: 4
- “Open collector” discrete outputs features:
  - maximum voltage - 45V
  - maximum commutated current – 100 mA
- RS-485 interface: 1
- RS-232 interface: 2
- 1-Wire Interface: 1
- CAN Interface: 1
- Push-to-talk plug JACK 3.5 mm: 2.
- Linear audio output with “autoinformer” function: 1
- Audio output equipped with “autoinformer” function for loudspeaker connection: 1
- Acceleration meter type: digital, triaxial
- In-built anti-tamper switch
- Battery: Li-Pol 1000mA/h 3.7 V (3.7 W/h)
- Memory card slot MicroSD: 1
- Ingress protection, class: IP65
- Mechanical impact protection, class: IK07
- Number of route records saved:
  - when using internal memory: 150000;
  - when using memory card MicroSD: 8000000 for each GB of memory
- PC connection interface: USB.
- Operation temperature<sup>1</sup>:
  - Without battery: -40..+85°C.
  - With battery: -40..+60°C.
- Power voltage: +8..+48 V of unregulated direct current
- Current consumption (at the supply voltage 12 V):
  - maximum: 500 mA
  - medium: 100 mA
- Dimensions: 147x138x25 mm
- Weight: not more than 250 g.

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<sup>1</sup> In order to prolong battery service life its charging start only at 0°C temperature. Data transmission to the server start at temperature above -40°C.

### 3 Design

The tracker consists of a microcontroller, non-volatile memory, GLONASS/GPS-modules, GSM-module, RS-485 digital interface, RS-232 digital interface, 1-Wire digital interface, CAN digital interface, analogue (discrete) inputs, pulse (discrete) inputs, discrete outputs, an acceleration meter, a memory card interface.

**GLONASS/GPS module** is used for receiving signals from satellites of GLONASS/GPS systems and receiver antenna positioning (latitude, longitude and altitude) as well the exact GMT time, travel speed and direction.

**GSM/GPRS module** installed in the tracker has the following functions:

- Setting and maintaining the outbound TCP/IP connection (receiving and transmitting data in GPRS mode);
- SMS messages receiving and sending;
- Incoming voice call receiving and voice connection setting.

For data transmission GSM/GPRS module establishes and maintains connection to the server and from time to time transmits information packets. Time of data transmission to the server during the vehicle parking and movement is different and might be changed by the user.

For displaying the working condition, the tracker has got 3 LED indicators: red, green and blue.

**Red LED indicator** displays presence/absence of the tracker external power supply. When the external power supply is there, the light is always on.

**Green LED indicator** displays the GLONASS/GPS module condition:

–blinks four times: GLONASS/GPS module is switched off because of the low battery and the external power supply cut off;

–blinks three times: GLONASS/GPS module is switched on but no data have been received from it yet;

–blinks twice: data from GLONASS/GPS module have been received but coordinates are not valid;

–blinks once: GLONASS/GPS module has defined the time and the valid coordinates.

**Blue LED indicator displays the GSM/GPRS module condition:**

- blinks four times: GSM module is switched off because of the low battery and the external power supply cutoff;
- blinks three times: GSM module is switched off for reinitialization;
- blinks twice: GSM module is switched on but there is no connection to the server;
- blinks once: the tracker has installed connection to the server and is successfully transmitting information packets;
- is always lighting up and switching off for short moments: SIM-card is not available.

See the contacts arrangement for MF-24F plug of the tracker in Figure 2.

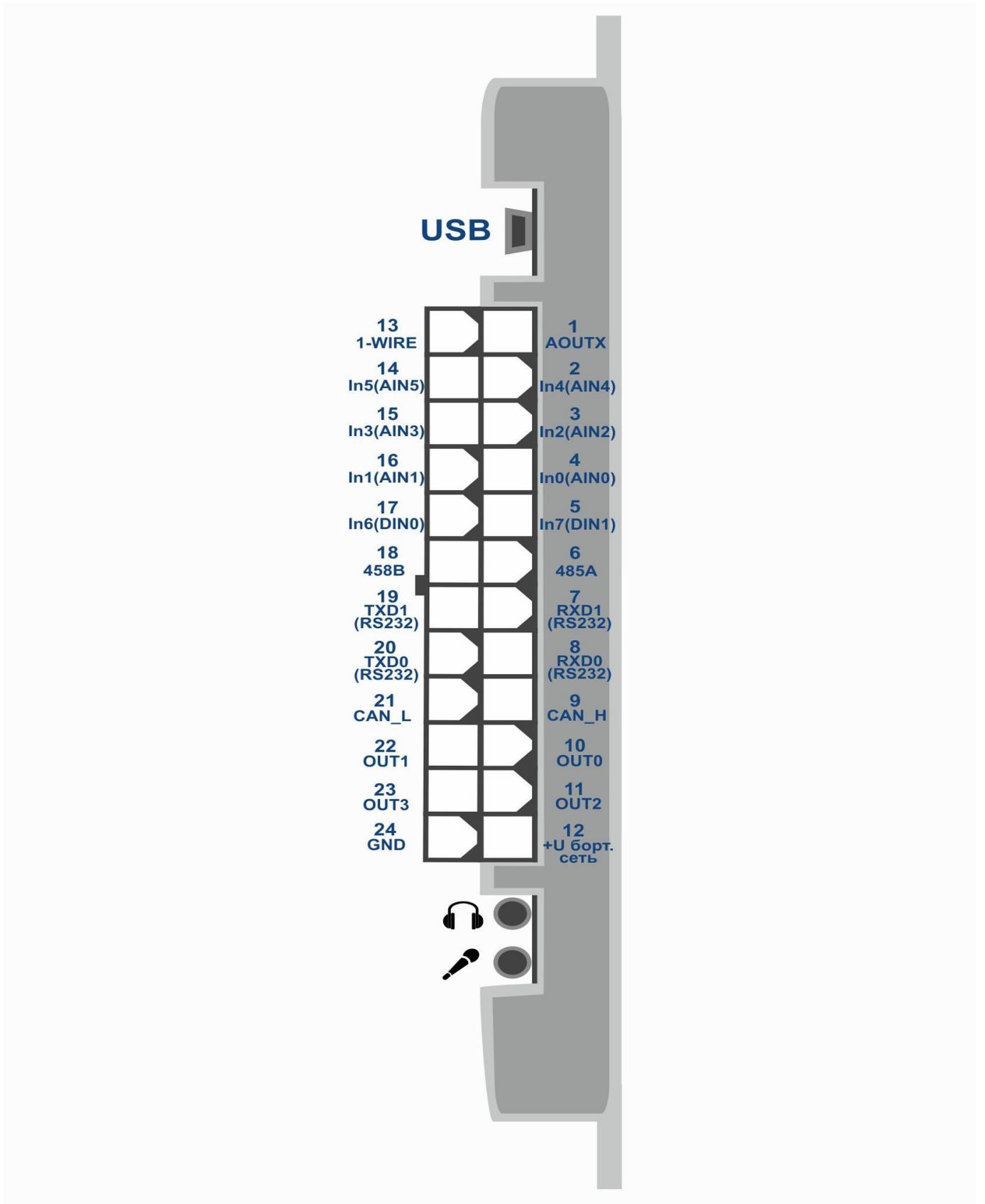


Figure 2 — Contacts arrangement (12 +U vehicle (electrical system))

## 4. Tracker operation rules

Tracker installation should be performed by persons familiarized with operation principles, item design and this Operation Manual. When using the tracker, the staff should follow the recommendations according to safety precautions applied while working with consumers' power units.

### **It is forbidden:**

- to use the tracker in any conditions different from those described in relation to the tracker technical features.
- to use tracker with damage and/or liquid penetration signs.
- to open the tracker case when it is under voltage as well as to open its case by someone who does not have necessary qualification, did not familiarize with operation principles, item design and this Operation Manual.
- to clean the tracker with any aggressive liquids, solvents, chemical or abrasive agents capable to harm its case, energy-supply elements, fixing system or disturb proper function of the tracker in any way. For cleaning it is necessary to use a clean dry cotton tissue or a soft brush.
- Intentionally bring the tracker into condition not previewed by this Operation manual, technical requirements or other documents describing the tracker operation.
- to use the tracker in cases, which may cause its damage, harm its energy-supply systems, affect staff's health or use it in any other way causing dangerous situations and financial losses.

After trackers transportation in sub-zero temperatures they should be stored at room temperature within 24 hours.

## 5 Installation procedure

The internal GLONASS/GPS and GSM antennas are used in the tracker, which allow for its installation almost in any place of the vehicle. However, it is not recommended to install it in the places where the received signals will be attenuated by the vehicle metallic housing, since this may affect the tracker operation quality.

Before installation, it is necessary to install a SIM-card with activated data transmission service via GPRS, SMS and sufficient balance for these services. Then the power is supplied to the MF-24F connector wires: the plug contact 12 is connected to the positive voltage of the vehicle electrical system, the plug contact 24 – to the negative voltage of the vehicle electrical system (housing, GND). Contacts arrangement layout for MF-24 connector is provided in the Figure 2. It is necessary to install a 2A melting fuse between the positive ground of the vehicle

electrical system and the tracker 12 contact plug. Install the melting fuse as close as possible to the vehicle electrical system entry because this is very important when connecting to the battery tracker. Connection layout for the tracker power supply is provided in the Figure 3.

When the power supply is properly connected, the green and blue LED will have been blinking many times during five seconds. When there are valid data from satellites and the connection to the server is installed, the tracker will identify time, coordinates and transmit information packets to the server, which will be announced by a single green and blue LED blinking.

It is strictly recommended to carry out a preliminary check of the tracker operation condition under laboratory conditions using instead of the vehicle electrical system laboratory power source ensuring the output voltage from 10V to 40V of the direct current and at least the 1A current.

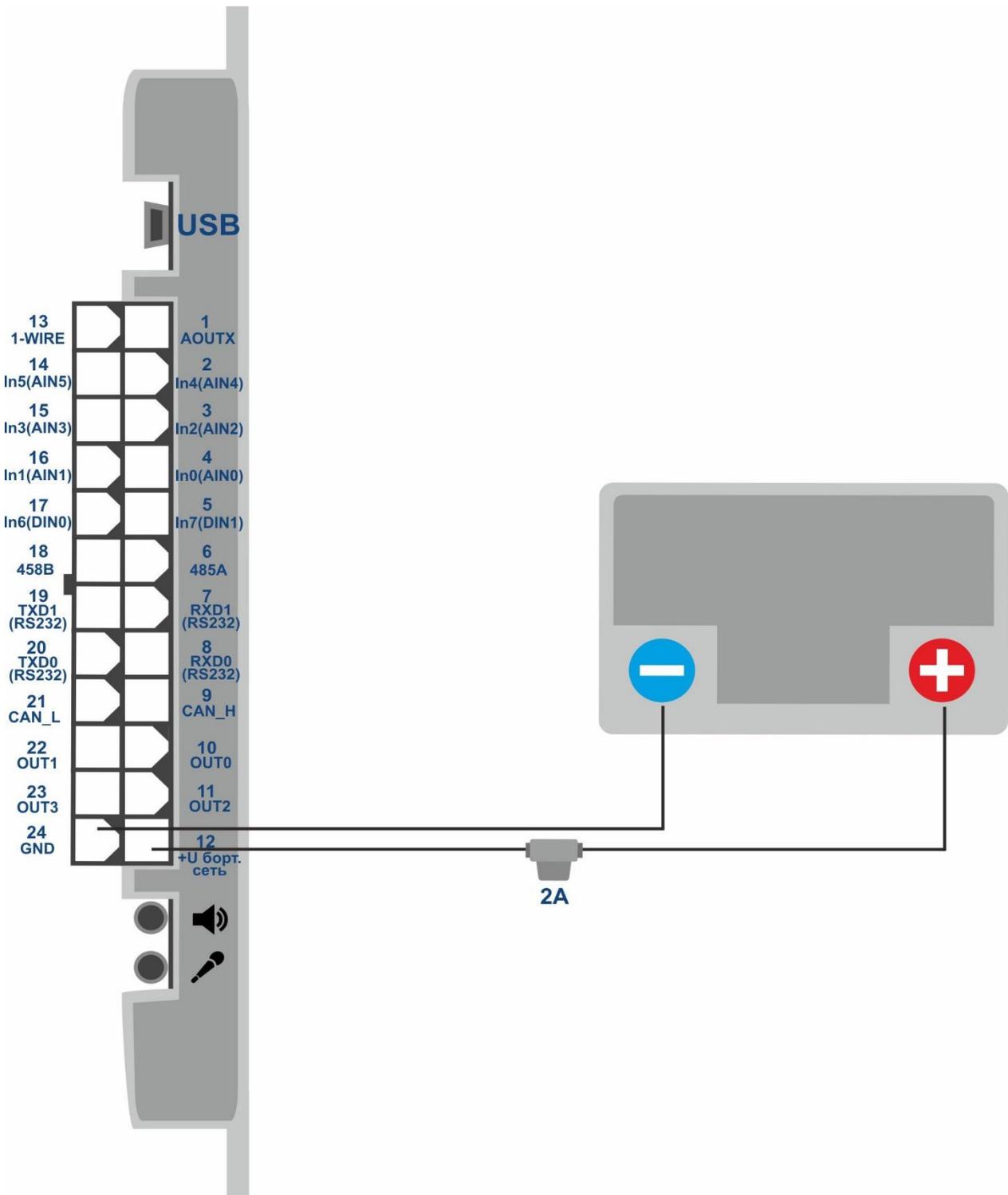


Figure 3 - Typical connection layout for the tracker power supply (12 +U vehicle electrical system)

## 6 Tracker setting

The tracker is controlled by means of commands sent via SMS, GPRS or USB.

### General rules for writing commands:

- only Latin alphabetic characters and punctuation may be used in commands;
- character case does not matter;

- commands transmission syntax is the same for SMS, GPRS and USB;
- all commands syntax: «CMD X1,...,X3», where CMD is a command, X1..X3 are commands parameters.
- commands are separated by a SPACE. Parameters are separated by commas, except for the DN0 command which parameters are separated by a colon.

After receiving a command, the tracker executes it and sends a feedback.

If the command parameters extend beyond the acceptable range, the tracker changes them to the nearest acceptable values. If it is not possible to change parameters or parameters are not enough, the tracker will answer with an error message. The command without parameters will restore to the current settings.

To set the terminal via USB it is necessary to install the ADMConfigurator program available at the website <http://neomatica.com>. If a password has been set, it should be entered immediately after connection in the respective ADMConfigurator program window. If the tracker works with a default password ("0"), it is not necessary to enter the password.

No authorization is required for configuration via GPRS.

## 6.1 Phone number authorization

To handle the tracker via SMS-commands it is necessary to send the SMS command «**ADD ME 0**» to the SIM-card number installed in the tracker, where 0 is the default password. If the password has been changed, the new one should be indicated. The phone number, which such a command is sent from, will be authorized in the tracker. In response, an SMS containing the authorized phone numbers list will be sent. If a wrong password is entered, the SMS will not be sent, and the command will be disregarded. The authorized phone numbers list might be requested with the «**PHONES**» command.

The authorized phone numbers list is stored in non-volatile memory. The maximum quantity of phone numbers saved is 4. Clearing the authorized phone numbers list is made by restoring to factory settings.

## 6.2 Server connection settings

Set APN parameters for the selected mobile operators by the «**SETGPRS0**» command for SIM card 0 and «**SETGPRS1**» for SIM card 1. Then set the IP-address and the server port (host) by the «**SETHOST0**» command or «**DN0**».

These parameters change might be performed in graphical interface of ADMConfigurator program.

## 6.3 Data transmission settings

Navigation data and the data collected from different sensors, which are sent from the tracker to the server, are divided into blocks. Depending on the functions used the set of transmitted data is defined by the «**PROTOCOL**» command.

Data block compliance with the command parameters values are provided below in the Table 1. If it is necessary to transmit data from several blocks, «**PROTOCOL**» command parameter is calculated based on addition. It is possible to use any variants.

For saving traffic it is recommended to activate only necessary data blocks.

For example:

basic data(0)+analogue inputs(8)+fuel level sensors(32)=PROTOCOL 40

basic data(0)+analogue inputs(8)+outputs, events as per inputs(4)=PROTOCOL 12

basic data(0)+pulse inputs(16)+odometer values(128)=PROTOCOL 144

Table 1. Basic parameters values for PROTOCOL command

Data block name		Parameter value
Basic data	NAVIGATION DATA	0
Outputs, events per inputs	OUTS	4
Analogue inputs	IN_A	8
Pulse inputs	IN_D	16
Fuel level sensors	FUEL	32
Can	CAN	64
Odometer value	ODOMETR	128

## 6.4 Setting coordinates freezing during a parking

The margin of error might cause a slight coordinates dispersion during a long-term parking of the vehicle. To prevent this effect the coordinates freezing function might be used in the beginning of the parking. This mode is activated automatically when there is no vibration (installed by default), or when the discrete level is changed in the analogue input (setting is needed).

The acceleration meter measures the current level of vibration (accelerations sum in three axis). If the vibration level below the threshold continues more than a minute and half, the tracker records the last valid coordinates received from GLONASS/GPS module and transmits them to the server in all further packets. When the vibration level threshold increases more than by 5 seconds, the coordinates freezing mode is deactivated, and the valid coordinates received from GLONASS/GPS module are transmitted. The vibration level threshold is installed by the «**MAXACC**» command. This mode activation is performed by the INSTATIC 15,1 command.

To enable the freezing coordinates function when the vehicle ignition is switched off, it is necessary to connect to the analogue input a circuit being under voltage when the ignition is on. This mode activation and input selection are performed by the «**INSTATIC**» command. For the analogue input used it is necessary to set values of the logical one «**INTRUE**» and the logical zero «**INFALSE**». In this way, when the ignition is off, an event will be formed in the input and the coordinates freezing will be initiated.

Switching coordinates freezing on and off during short-term stops is performed by the «**PSTATIC**» command. This method does not require extra signal connection to the tracker but does not exclude a slight coordinates dispersion in adverse conditions for receiving signals from satellites.

## **6.5 Using the microSD memory card as a “black box”**

The tracker allows using the microSD memory card as a “black box” for saving data transmitted to the telematic server. For this, it is necessary to put the memory card in the holder and send the «**SDLOG**» command. After this, the terminal will be rebooted. It is possible to save 8 million events per each 1 GB of the card. Therefore, it allows saving almost an unlimited route. The procedure of data extraction to the server is feasible depending on time and relevance. The procedure is set by the «**SERIAL**» command.

# **7 Extra equipment connection**

## **7.1 Analogue inputs**

Analogue inputs might be used for analogue sensors connection and voltage level measuring. Each analogue input might be interpreted as a discrete one.

### **IN0 input features:**

Voltage measurement range: 0-6,6V.

Discreteness (sensitivity): 6mV

The minimum input resistance: 110kOhm

### **IN1 input features:**

Voltage measurement range: 0-13,3V.

Discreteness (sensitivity): 13mV.

The minimum input resistance: 110kOhm.

### **IN2-IN5 inputs features:**

Voltage measurement range: 0-36,6V.

Discreteness (sensitivity): 36mV.

The minimum input resistance: 110kOhm.

If the voltage level in a given circuit does not exceed 6,6 V or 13,3 V, it is recommended to use IN0 or IN1 to enhance readings transmission accuracy.

It is prohibited to supply voltage to the input if it exceeds the upper measurement range threshold by more than 20%.

The current voltage value in the analogue input is displayed in response to the «**INPUT**» command.

When it is necessary to smooth the measured voltage fluctuations, it is possible to set the time of readings averaging by the «**INFILTER**» command.

When there is a need for recording the fact of a certain voltage presence, for example, in the ignition activation circuit, it might be necessary to set for the selected analogue input voltage levels for the logical "0" by the «**INFALSE**» command and for the logical "1" by the «**INTRUE**» command

Commands description:

**INFALSE** IN, X0, Y0

IN – number of the analogue input

X0 – the lower logical 0 range threshold

Y0 – the upper logical 0 range threshold

**INTRUE** IN,X1,Y1

IN – number of the analogue input (0 or 1)

X1 – the lower logical 1 range threshold

Y1 – the upper logical 0 range threshold

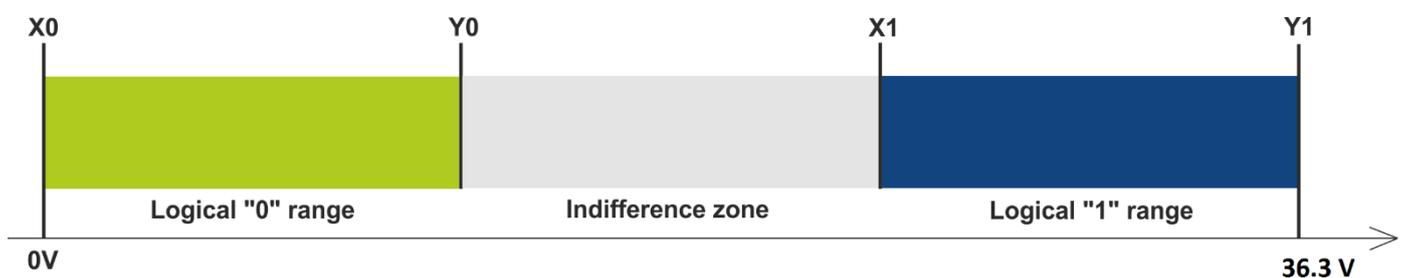


Figure 4 — Discrete states ranges

If the voltage level is in the indifference zone, the previous discrete state will be saved until the level is beyond the indifference zone.

The measured voltage levels values are registered by the tracker and transmitted to the server in the data block IN\_A with a common periodicity.

When the discrete state is changed, an extraordinary packet is sent, and the discrete state is transmitted in the OUTS data block.

Activate the required data blocks transmission with the «**PROTOCOL**» command.

## 7.2 Pulse inputs

Inputs IN6(DIN0), IN7(DIN1) are used for connecting frequency sensors, flowmeters, including differential ones to the tracker. These inputs might be set as discrete inputs with an inner pull-up to the plus.

Discrete (pulse) inputs operation mode is set by the «**IMPULSE X, Y**» command

X – DIN0 input mode, Y – DIN1 input mode

Examples:

IMPULSE 0,0 – pulse inputs in the “Frequency meter” mode

IMPULSE 1,1 – pulse inputs in the “Flowmeter” mode

IMPULSE 1,2 – pulse inputs in the “Differential flowmeter” mode

IMPULSE 3,3 – pulse inputs in the “Discrete input” mode

«Frequency meter», «Flowmeter» and «Discrete input» modes might be chosen in any combination. The «Differential flowmeter» mode works with both inputs.

To transmit data from discrete (pulse) inputs to the server it is necessary to activate the «IN\_D» data block with the «**PROTOCOL**» command. Depending on the operation mode selected, the response to the «**INPUT**» command will contain frequency, flowmeter accumulated values or current state of the discrete input.

### 7.2.1 «Frequency meter» mode

The «Frequency meter» mode allows measuring the current signal frequency. It is used when connecting frequency output sensors. Connection layout for a fuel level output sensor is provided in the Figure 5.

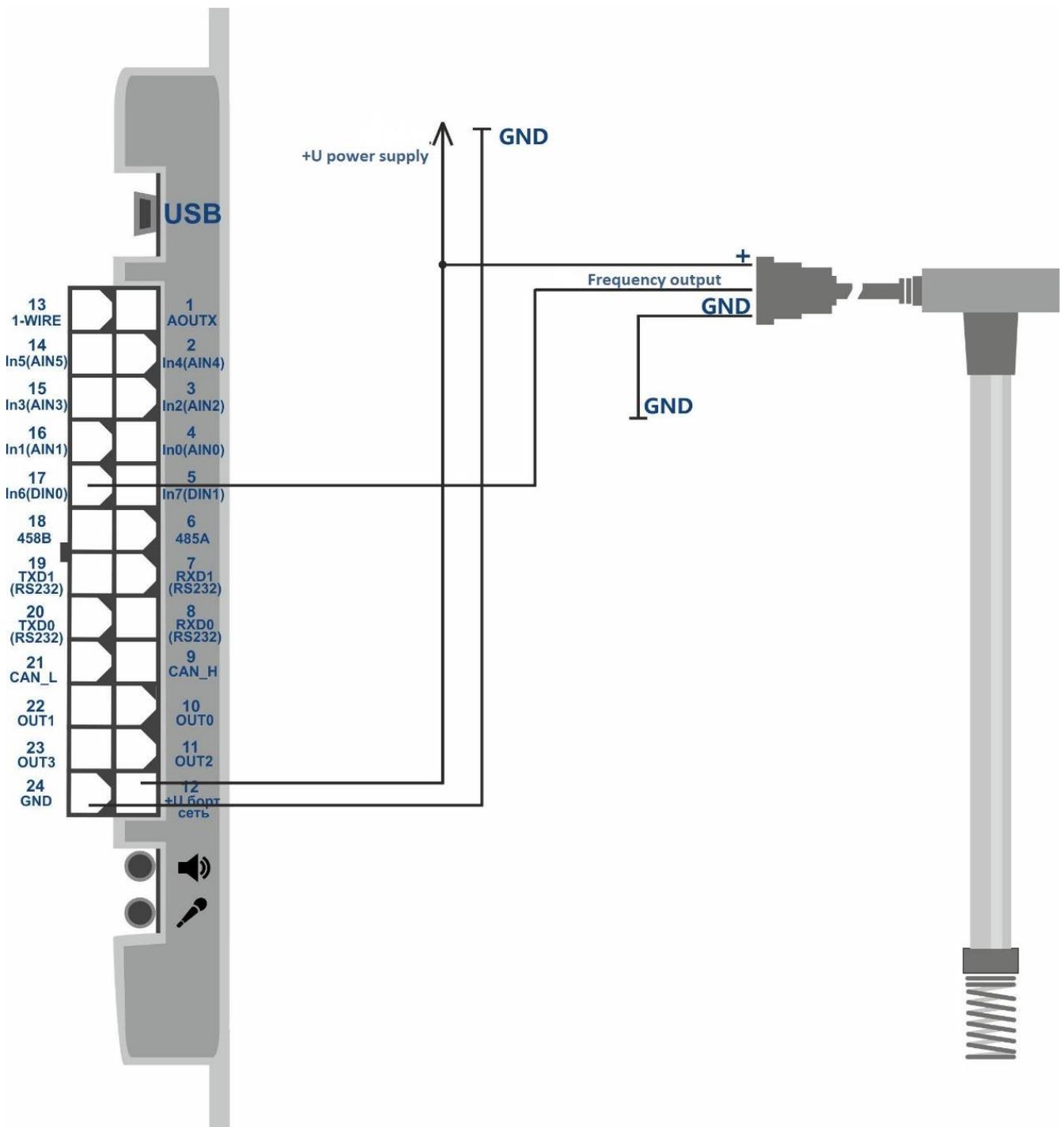


Figure 5 — Connection layout for fuel level frequency output sensor (12 +U vehicle electrical system)

### 7.2.2 «Flowmeter» mode

«Flowmeter» mode allows counting pulses and saving data in the non-volatile memory. A layout for connecting two flowmeters to the tracker is provided in the Figure 6.

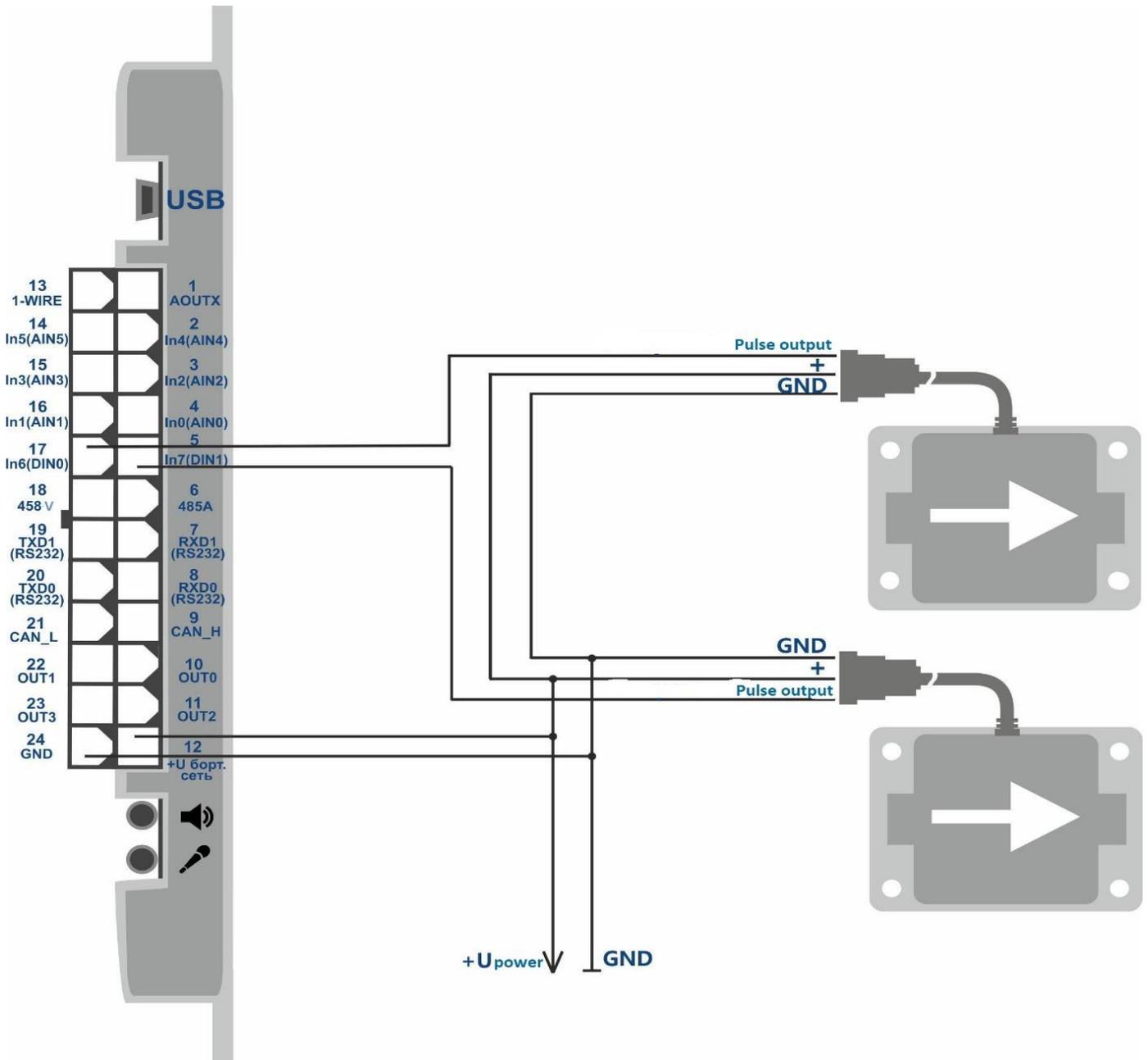


Figure 6 — Connection layout for two flowmeters (12 +U vehicle electrical system)

### 7.2.3 «Differential flowmeter» mode

Differential mode is used when connecting two flowmeters installed in direct and reverse fuel supply line. The direct supply flowmeter should be connected to the input DIN0, and the reverse supply flowmeter – to the input DIN1. Calculation is made according to the formula  $DIN0 = DIN0 - DIN1$  (the difference is transmitted to the server instead of DIN0). DIN1 is transmitted without change. A layout for connecting a differential flowmeter to the tracker is provided in the Figure 7.

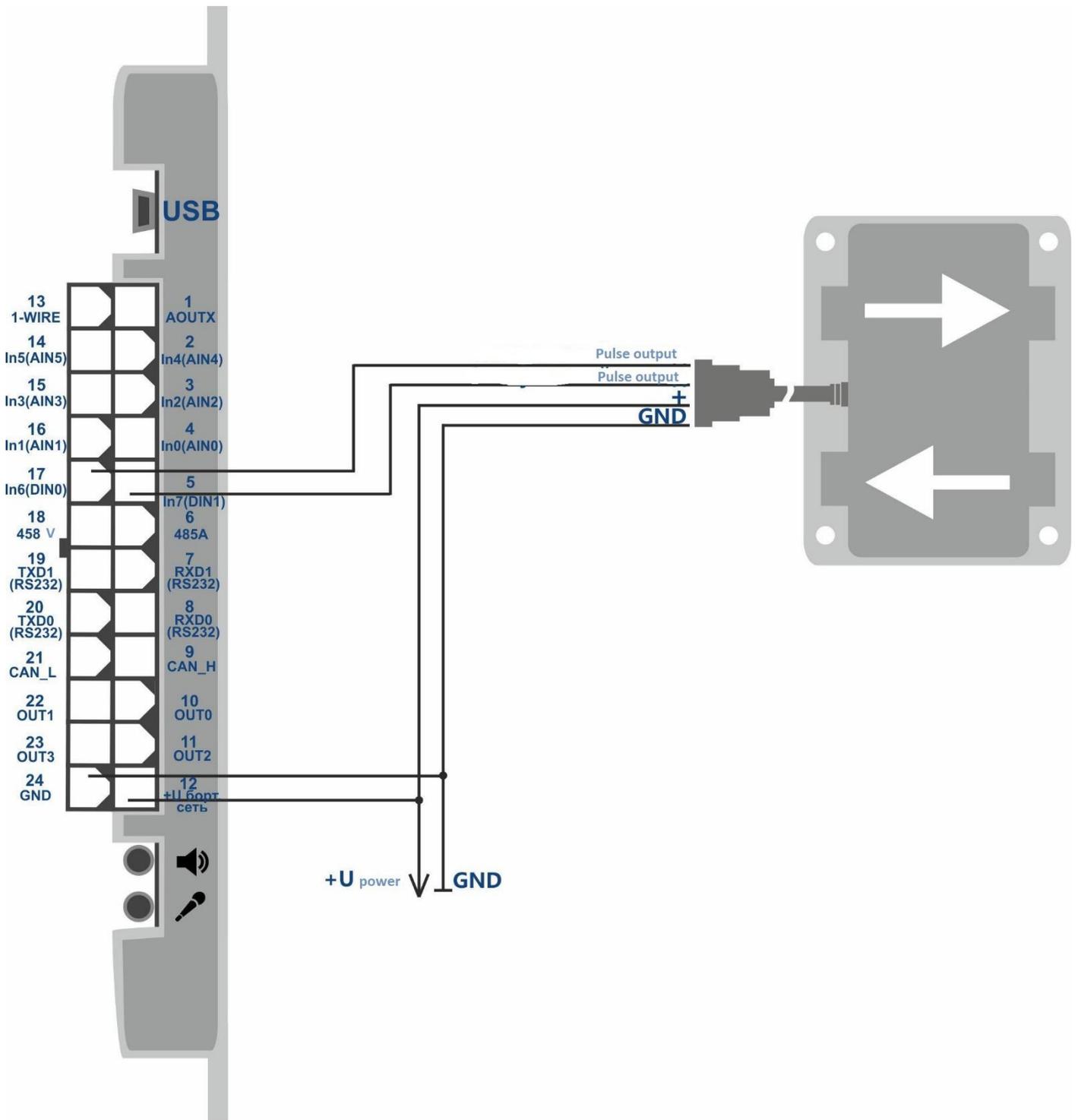


Figure 7 - Connection layout for a differential flowmeter (12 +U vehicle electrical system)

### 7.2.4 Discrete input

The «discrete input» might be used to control condition of equipment having the “open collector” type output, or to control condition of equipment switched ON and OFF according to the ground.

Discrete inputs have an inner pull-up to the plus. When connecting the discrete input to the variable voltage circuit, the logical “0” level will be defined based on voltage fewer than 1 V, and

the logical “1” level – based on the voltage greater than 5 V. When connecting to the circuit having both open or close circuit to ground states, the logical “1” is transmitted during the open circuit state (in a disconnected condition), the logical “0” - during the close to ground state (vehicle electrical system minus). A layout for a door limit switch connection is provided in the Figure 8.

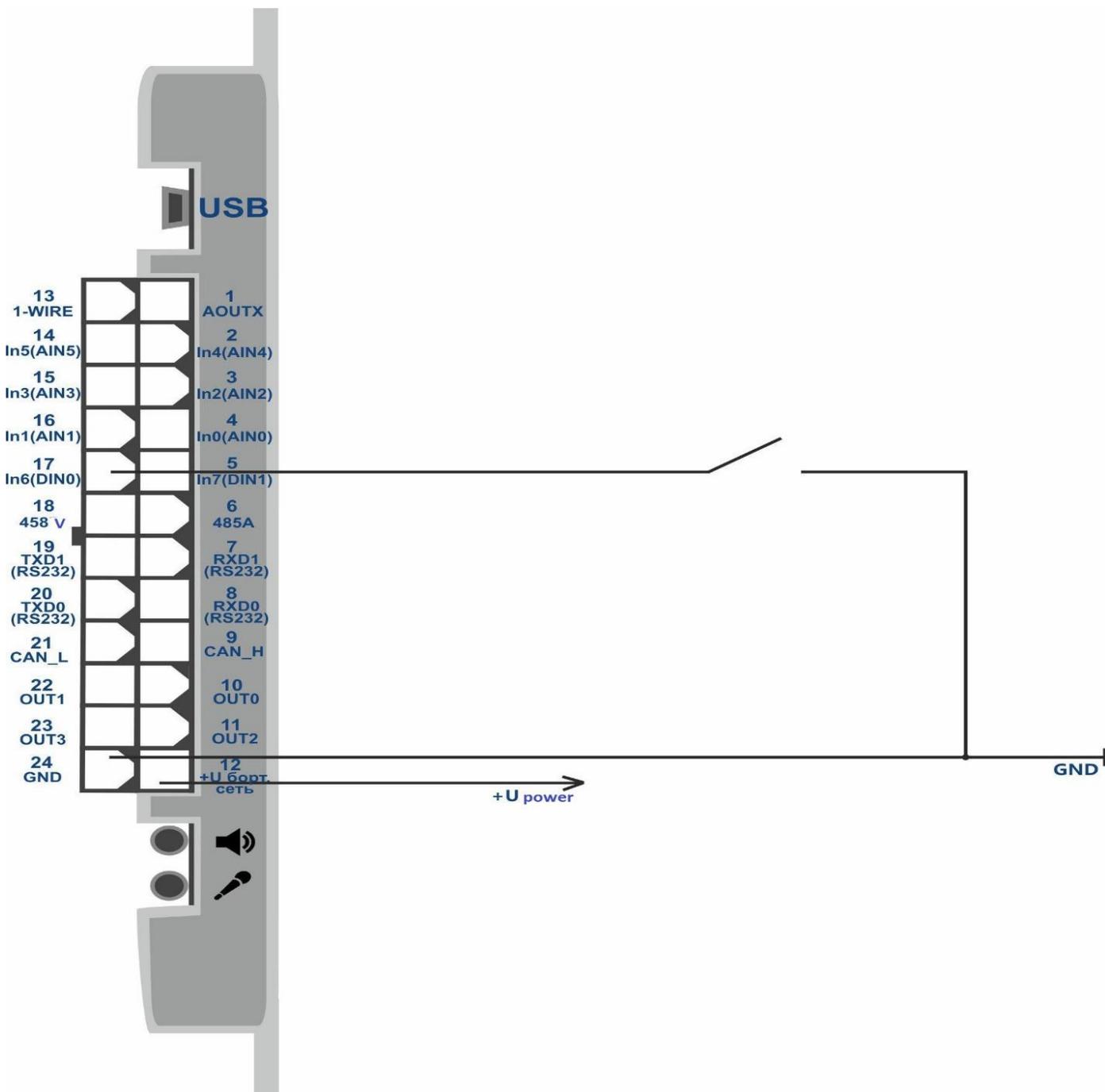


Figure 8 - Connection layout for a door limit switch (12 +U vehicle electrical network)

### 7.3 Discrete outputs

#### OUT0-3 discrete outputs features:

Output type – open collector

Maximum voltage – 45 V

Maximum commutated current - 100 mA.

Discrete outputs (OUT-3) allow handling extra equipment. When switched on, a discrete output is connected to the minus of the tracker external power supply, and the connection should be performed according to the layout.

It is allowed to connect devices with the maximum current consumption not exceeding 100mA, otherwise there is a risk to damage the tracker. When a more powerful load commutation is needed, it is necessary to use a relay.

To prevent the tracker exposure to self-induction pulses, which appear after switching off the inductive load (including the relay coil), it is necessary to connect a diode in parallel to the relay coil in the opposite direction. A layout for connecting relay to the tracker discrete output is provided in the Figure 9. A layout for connecting buzzer and LED to the tracker discrete output is provided in the Figure 10.

It is possible to control the output condition with the «**OUTPUT X,Y**» command.

X=0...3 – discrete output number

Y=1 – switch on (close the output to ground),

Y=0 – switch off (open the output to ground).

The response to the «**OUTPUT**» command always displays the condition of four outputs: OUTPUT (3..0) = 0000. It is possible to make the output condition dependent on an event at the analogue input via «**INTRUEOUT**» command.

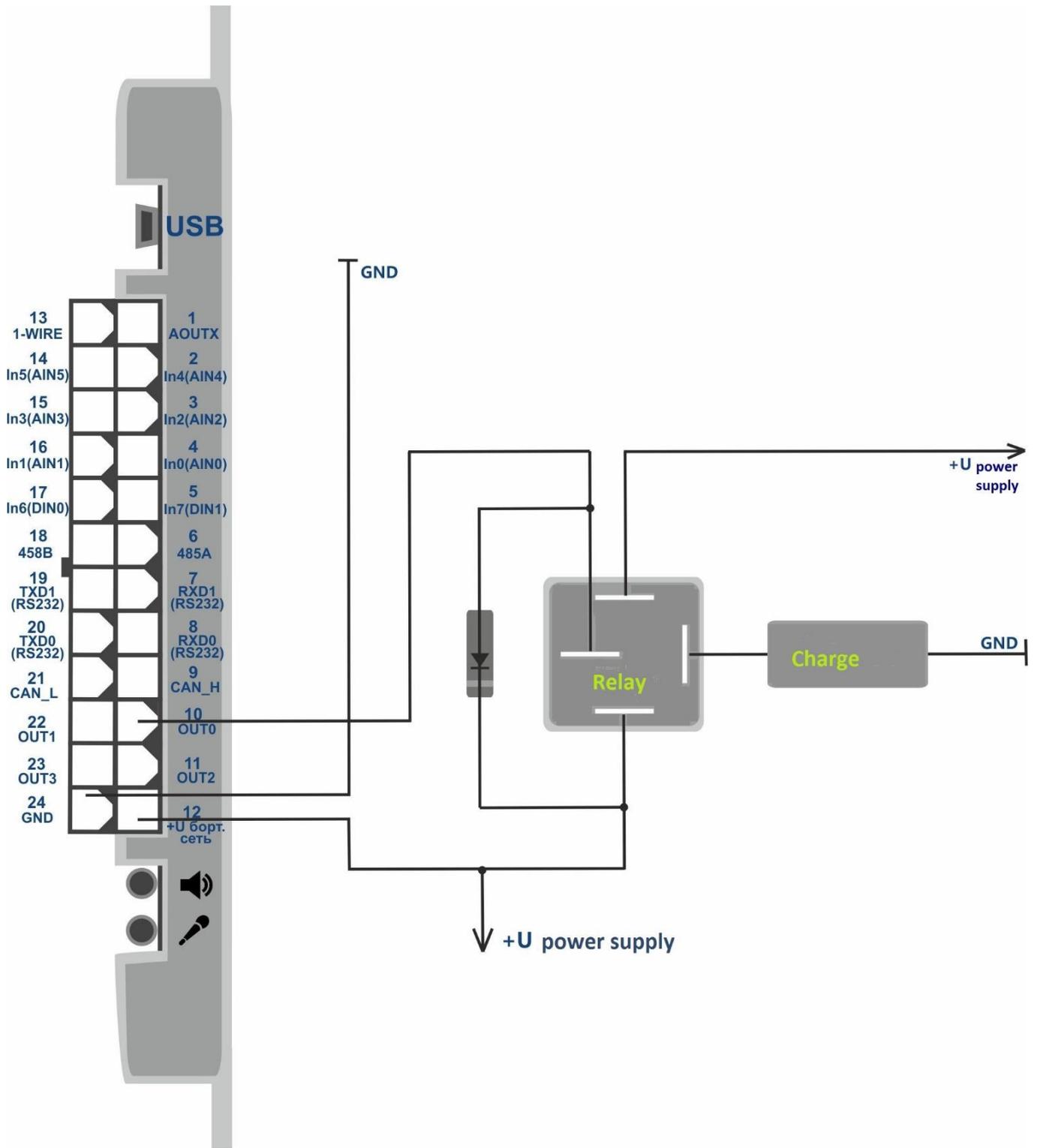


Figure 9 — Connection layout of a relay to the tracker discrete output (12 +U vehicle electrical system)

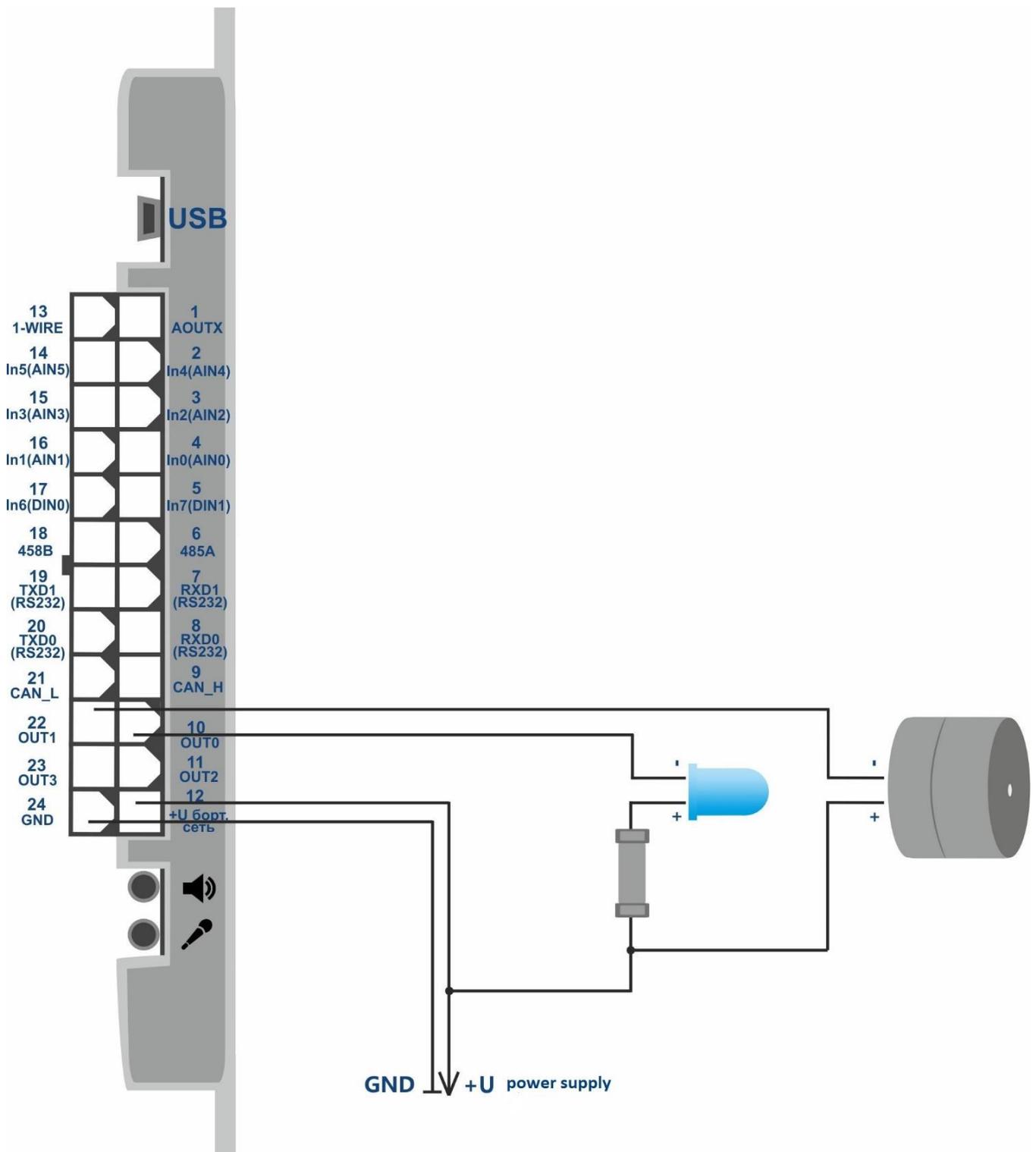


Figure 10 — Connection layout of a buzzer and LED to the tracker discrete output (12 +U vehicle electrical system)

To enhance driving safety, it is possible to use the tracker output for connecting a light and a sound alarm, which work off during an over-speed, a rapid acceleration and braking.

With the «**SPEEDALARM**» command set the speed value, which violation should be notified to the driver.

**SPEEDALARM X,Y**

X=0 – the number of an activated output

Y – speed km/h, which activates the selected discrete output when being violated

The command «**ACCELALARM**» sets acceleration and braking values which violation is notified to the driver.

ACCELALARM X,Y,Z,A

X=0,...5 – the number of an analogue input whose data are replaced by acceleration and braking

Y – braking limit activating the output

Z – acceleration limit activating the output

A – the number of an activated output

## 7.4 RS-485 Interface

### 7.4.1 Working with a digital fuel level sensor

The tracker allows a simultaneous connection of three fuel level sensors to the RS-485 bus. The tracker interrogates sensors one by one and transmits fuel level and temperature values in the “FUEL” data block.

Before connecting to the tracker, it is necessary to set the sensors:

- set the network address (addresses 0,1,2 will be interrogated by the tracker by default);
- select the interface speed 19200 bauds;
- switch off the automatic data output.

Connect sensors to the contacts 6, 18 of the MF-24F plug. Connection layout is provided on the Figure 11.

It is necessary to activate the “FUEL” data block transmission with the «**PROTOCOL**» command. The current fuel level value is displayed in the response to the «**FUEL**» command.

If necessary, the addresses of the sensors interrogated might be changed by the «**LLS485 X,Y,Z**» command.

X,Y,Z are addresses of interrogated sensors and addresses 0,1,2 are interrogated by default.

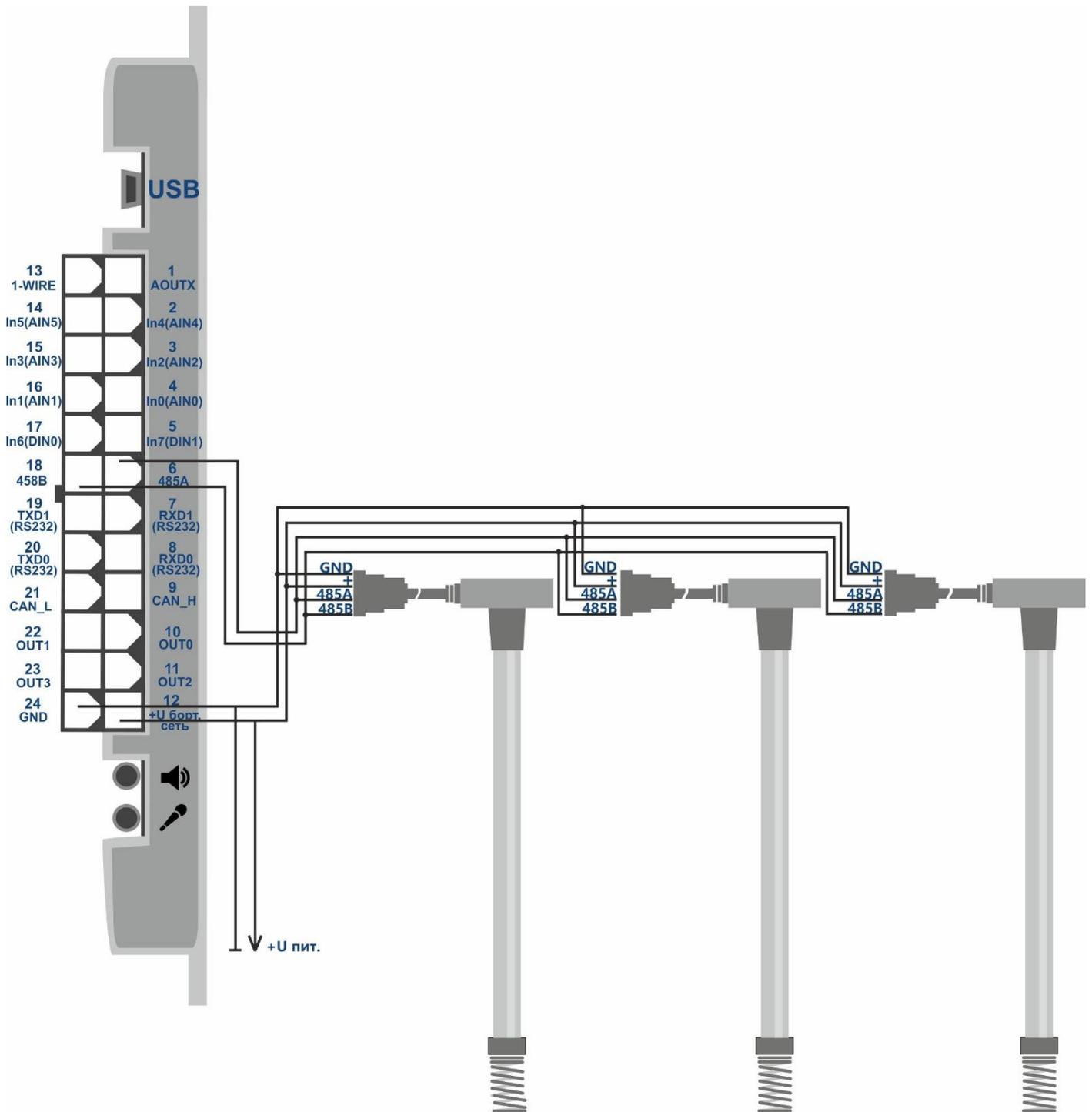


Figure 11 – Connection layout for LLS fuel level sensors based on RS-485 interface (12 +U vehicle electrical system)

#### 7.4.2 Working with the EUROSENS DELTA RS sensor

DELTA RS sensor connection is performed with the RS-485 interface. Sensor readings are transmitted instead of data from CAN-bus. It is necessary to activate the «CAN» data block with the «**PROTOCOL**» command. It is possible to transmit all data described in the Table 2. The command «**EUROSENSENABLED**» defines the data set requested from the sensor. It is necessary to indicate the requested data codes and fields separating them with commas. The repeated command rewrites the preset parameters.

Command parameters format:

EUROSENSEENABLED X0,Y0,X1,Y1,X2,Y2....

X — requested data code

Y — field number

Y=3 – two fields simultaneous transmission

Example:

1        2        3        4

EUROSENSEENABLED 0x00,1,0x10,2,0x14,2,0x15,3

- 1) Fuel amount since the sensor activation, 0.01 l
- 2) Accumulated fuel amount in nominal mode, 0.01 l
- 3) Accumulated fuel amount in supply chamber in “cheat” mode, 0.01 l
- 4) Accumulated fuel amount in the backward chamber in idle mode, 0.01 l
- 4) Accumulated fuel amount in the backward chamber in nominal mode, 0.01 l

The «**EUROSENSVALUES**» command allows checking the preset parameters current values. The «**EUROSENSADDRESS 255**» command deactivates the sensor request and parameters transmission to the server.

Table 2. EUROSENS DELTA RS sensor readings available for transmission

Requested data code	Field 1	Field 2
0x00	Fuel amount since the sensor activation, 0.01 l	Flow current speed, 0.1 l/h
0x01	Fuel amount in supply chamber since the sensor activation, 0.01 l	Flow current speed in supply chamber, 0.1 l/h
0x02	Fuel amount in the reverse chamber since the sensor activation, 0.01 l	Flow current speed in backward chamber, 0.1 l/h
0x10	Accumulated fuel amount in idle mode, 0.01 l	Accumulated fuel amount in nominal mode, 0.01 l
0x11	Accumulated fuel amount in “overload” mode, 0.01 l	Accumulated fuel amount in “cheat” mode, 0.01 l
0x12	Accumulated fuel amount in negative mode, 0.01 l	-----
0x13	Accumulated fuel amount in supply chamber in idle mode, 0.01 l	Accumulated fuel amount in supply chamber in nominal mode, 0.01 l

Requested data code	Field 1	Field 2
0x14	Accumulated fuel amount in supply chamber in “overload” mode, 0.01 l	Accumulated fuel amount in supply chamber in “cheat” mode, 0.01 l
0x15	Accumulated fuel amount in backward chamber in idle mode, 0.01 l	Accumulated fuel amount in backward chamber in nominal mode, 0.01 l
0x16	Accumulated fuel amount in backward chamber in “overload” mode, 0.01 l	Accumulated fuel amount in backward chamber in “cheat” mode, 0.01 l
0x17	Idle mode duration, sec	Nominal mode duration, sec.
0x18	«Overload” mode duration, sec	“Cheat” mode duration, sec
0x19	Negative mode duration, sec	-----
0x1A	Supply chamber idle mode duration, sec	Supply chamber nominal mode duration, sec
0x1B	Supply chamber “overload” mode duration, sec	Supply chamber “cheat” mode duration, sec
0x1C	Backward chamber idle mode duration, sec	Backward chamber nominal mode duration, sec
0x1D	Backward chamber “overload” mode duration, sec	Backward chamber “cheat” mode duration, sec
0x1E	“Intervention” mode duration, sec	Sensor work duration, sec

### 7.4.3 Working with RFID-reader ADM20

The tracker allows for a simultaneous connection of up to 5 RFID-readers ADM20 to the RS-485 bus together with other devices. An example of a simultaneous connection of RFID-reader ADM20 and fuel level sensor to the tracker is provided in the Figure 12.

Connection procedure and settings:

1. Set the RFID-reader ADM20 (setting procedure is described in the p. 4.3. of the Operation Manual “Receiver/transmitter combination ADM20”).
2. Connect RFID-reader ADM20 to the tracker RS-485 bus.
3. Coordinate the work of the tracker and RFID-reader ADM20 (setting procedure is described in the p. 5 of the Operation Manual “Receiver/transmitter combination ADM20”)

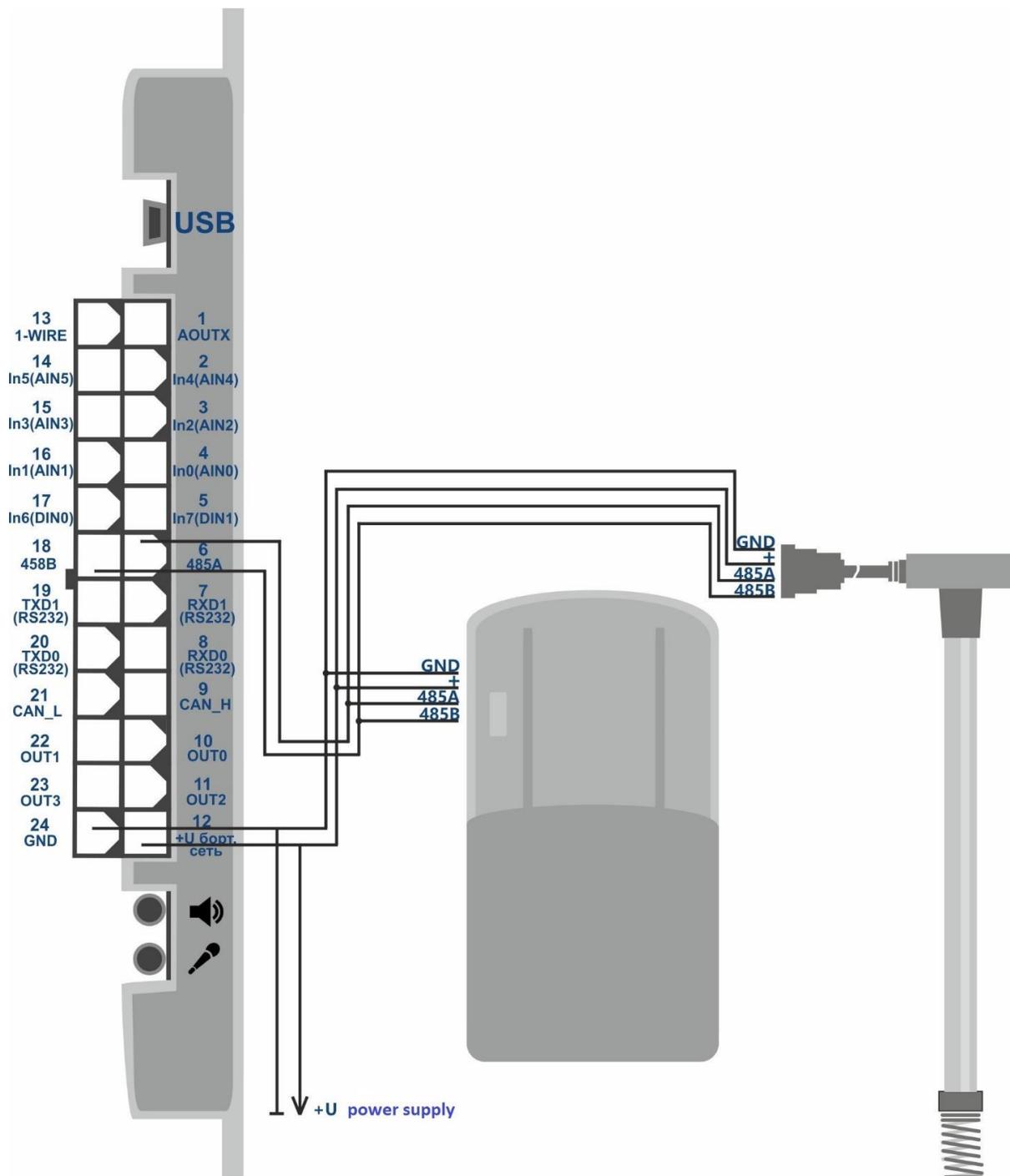


Figure 12 – Connection layout for RFID-reader ADM20 and Fuel level sensor based on the RS-485 interface (12 +U vehicle electrical system)

## 7.5 Interface RS-232

Depending on the equipment to be connected, it is necessary to configure the operating modes of the ports RS-232 0 and RS-232 1. This setting is performed by the "**SET232**" command or in the graphical interface of the ADMConfigurator program, version 2.1 or higher.

Command SET232 X, Y

X is the port number

Y - operation mode

Table 3. Eventual operation modes of the ports RS-232 0 and RS-232 1

Y parameter	Operation mode
0	Fuel level sensors
1	Camera, OV528 protocol
3	CAN-LOG
4	Fuel level sensors Autotracker

An example of setting with the command:

SET232 0,1 - for the port RS-232 0 the mode 1 is set.

SET232 1,3 - for the port RS-232 1, the mode 3 is set.

The «**SET232**» command without parameters requests the established modes of both ports, in the format:

Port number = port mode, Port number = port mode.

For example: 0 = 1,1 = 3, which means:

Port RS-232 0 = Camera, Port RS-232 1 = CAN-LOG.

### 7.5.1 Fuel level sensors connection

To connect fuel level sensors, it is necessary to do the following:

- disable automatic data output in the sensor settings;
- set the data transmission speed to 19200 bauds in the sensor settings;
- connect the fuel level sensors in accordance with the diagram in Figure 13;
- set the required RS-232 port to the operating mode with the fuel level sensor.

Data transmission is performed in the data block "Analog inputs". To do this, you must enable the corresponding data block with the «**PROTOCOL**» command. Transmission of the «**FUEL**» data block is not required.

The command «**LLSTOIN X, Y**» establishes the correspondence between the sensor address and the analog input number, instead of which the fuel level will be transmitted.

X is the number of the analog input

Y - sensor address

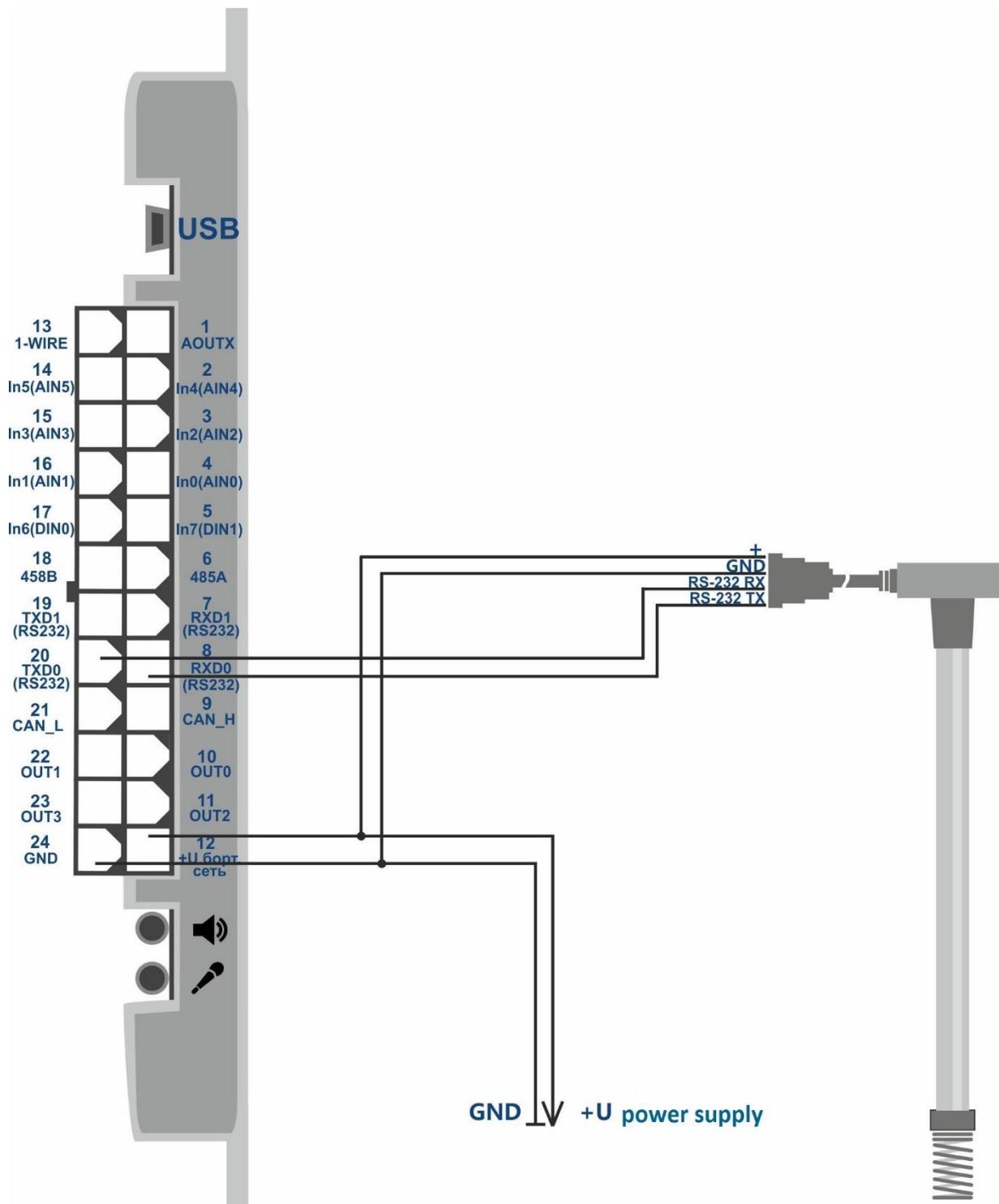


Figure 13 Connection layout of a fuel level sensor based on RS-232 interface (12 +U vehicle electrical system)

### 7.5.2 Photo camera connection

To connect the camera, do the following:

- install a microSD memory card (microSD memory cards up to 32GB with FAT32 file system are supported);
- connect the camera to any of the RS-232 ports;
- set the required RS-232 port to the camera mode;
- activate the connection with the camera using the command «**CAMENABLED X**».

X = 1 - function enabled,  
X = 0 - function disabled.

### Setting the camera mode

The tracker has two modes of shooting: periodic and by event.

In the "periodic" mode, the photo-taking is performed after a preset period of time. The time between saving photos in the "periodic" mode is set by the command **«CAMPERIOD X»**  
X is the time in seconds.

In the "by event" mode, the photo-taking is performed when the logic level on the analog input changes. To properly operate in this mode, it is necessary to adjust the voltage levels for discrete states on the analog input (see clause 7.1 Analog inputs).

Parameters of the "by event" mode are set by the command **«CAMEVENT X, Y, Z»**.

X is the number of the analog input, which initiates the photo-taking when the logic 1 appears thereon.

Y is the number of photos in a series. If Y = 0, the photo-taking will stop only when a logical 0 appears on the selected analog input.

Z is the time between photo-takings, in seconds.

It is also necessary to set the range for the logical "0" and the logical "1" for the selected input.

**ATTENTION!** After the configuration is completed, the tracker needs to be restarted.

### Transferring photos to the server

Saving a photo to a microSD memory card takes up to 7 seconds. Sending one photo to the server takes 15-120 seconds, depending on the network condition. Pictures are saved in 640x480 resolution and take about 45-50kb each on a microSD memory card.

Photos transferring to the server is activated by the command **«CAMUPLOAD X»**.

X = 1 - enable photos transferring to the server,

X = 0 – disable photos transferring to the server.

**«CAMUPLOADSIZE»** displays the number of shots in the queue for transmission to the server. **«CAMUPLOADNUL»** cancels the upload to the server of all photos on the memory card that are in the transmission queue.

### 7.5.3 CAN-LOG connection

To connect the CAN-LOG, do the following:

- perform a CAN-LOG connection to any of the RS-232 ports in accordance with the diagram shown in Figure 14;
- set the required RS-232 port to the operation mode with CAN-LOG;
- enable transmission of the CAN data block with the «**PROTOCOL**» command or in the graphical interface of the ADMConfigurator program.

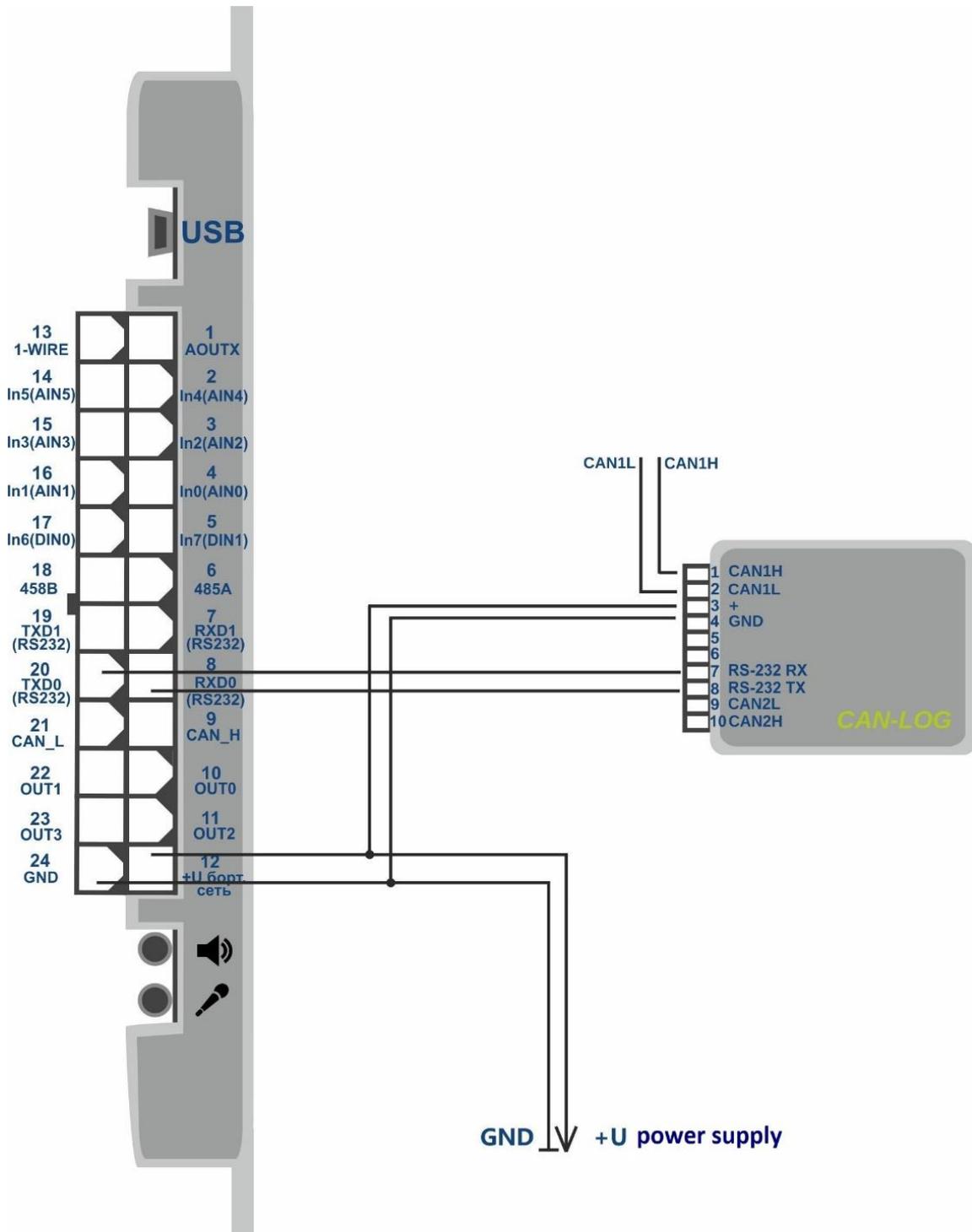


Figure 14 – Connection layout of CAN-LOG to the RS-232 interface (12 +U vehicle electrical system)

#### 7.5.4 Autotracker fuel level sensors connection

To connect the Autotracker fuel level sensors, do the following:

- connect the fuel level sensors to any of the RS-232 ports;

- set the required RS-232 port to the Autotracker mode;
- enable the data block "FUEL" transmission with the **«PROTOCOL»** command.

The **«LLSAT»** command shows the current fuel level read from the Autotracker sensors.

### 7.5.5 Tachograph connection

The tachograph connection is made to the RS-485 bus or to any of the RS-232 ports. Then, you should select the type of tachograph and the tracker port in the graphical interface of the ADMConfigurator program (version no lower than 2.1) or with the command **«TACHOENABLED X, Y»**.

X - Type of the connected tachograph.

X = 0 - Tachograph VDO

X = 1 - Tachograph SHTRICH-M

X = 255 - function disabled

Y - Terminal Port

Y = 0 - RS232\_0

Y = 1 - RS232\_1

Y = 2 - RS485

If necessary, readings transmission from the tachograph odometer should be enabled, instead of the readings from the built-in odometer of the tracker via the command **«TACHOTRODOMETR X»**.

X = 0 - readings from the tracker odometer are transmitted

X = 1 - readings from the tachograph odometer are transmitted

The ODM command shows the current value of the active odometer in meters.

It is necessary to include the transfer of driver's card numbers in the fields intended for transferring the voltage level on the analog inputs AIN4 and AIN5 using the command **«TACHOTRCARDNUMBER X»**.

X = 0 - transmission disabled

X = 1 - transmission enabled

The command **«TACHOGETCARDNUMBER X»** shows the number of the inserted map, X - the number of the tachograph slot.

To start uploading the DDD file from the tachograph to the monitoring system via GPRS, you should send the **«TACHOGETDDD X»** command, where X is the card slot number.

## 7.6 Working with a headset

The tracker allows for giving outgoing calls to the pre-entered numbers. To give an outgoing call, it is necessary to press the headset button. The numbers for outgoing calls are added with the **«EVENTLISTADD»** command. The outgoing call is given to the number, which is the first in the list. If connection fails, the tracker passes to the next number in the list. In case when no number is available, calling will be stopped. The list of numbers is reviewed by the **«EVENTLISTSHOW»** command, and cleared by the **«EVENTLISTCLEAR»** command. The **«MAKECALLTIME»** command sets the time during which the tracker will be trying to call to each number. The **«RINGS»** command sets the number of calls attempts, after which the autoreply to the incoming call will be initiated. The call loudness is adjusted by the **«RINGVOLUME»** command, the interlocutor's voice loudness is set in the headset, and the microphone sensitivity – by the **«VOLUME»** command.

## 7.7 1-Wire bus

Up to 8 temperature sensors can be connected to the 1-Wire bus. To do this, you should do the following:

- connect the temperature sensors to the 1-Wire bus in accordance with the diagram in Figure 15;
- configure the bus with the **«OWCONFIG»** command (after the OWCONFIG command is entered, each device gets a sequence number);
- enable the transmission of the "Analog Input" data block by the **«PROTOCOL»** command;
- enable the transfer of the temperature sensor readings by the command **«OWTHERMOENABLED 1»**.

The readings from temperature sensors are transmitted in the fields intended for transferring the voltage level at the analog inputs. The sensor numbers assigned when configuring the 1-Wire bus with the **«OWCONFIG»** command correspond to the numbers of the analog inputs. Disabling the temperature sensor readings transmission is done with the command **«OWTHERMOENABLED 0»**.

The command **«OWCONFIGINFO»** shows all the connected devices and assigned sequence numbers.

To request the readings from any of the sensors connected to the 1-Wire bus, enter the **«OWTHERMO X»** command, where X is the sensor serial number (0 ... 7).

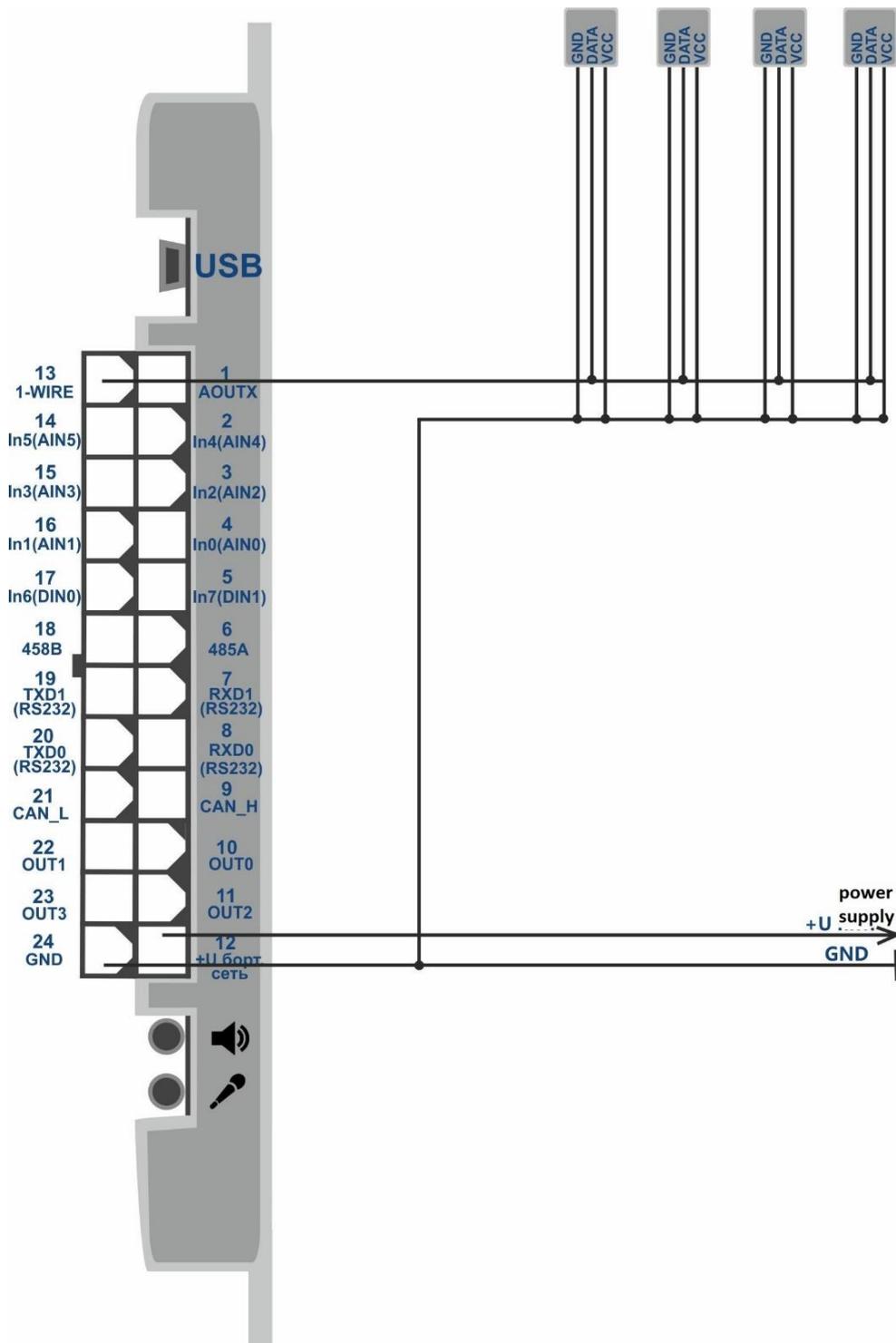


Figure 15 – 1-Wire temperature sensors connection (12 +U vehicle electrical system)

## 8 Autoinformers

The tracker allows you to make voice notification about the stops. After the necessary setup and connection are performed, the device will play the sound files recorded on the memory card when entering the specified zones. During the movement, the tracker checks the current geographic coordinates for correspondence to the zones of the played files. When this correspondence is found, the tracker plays the respective sound file. The layout for identifying the zone for playing the audio file is shown in Figure 16.

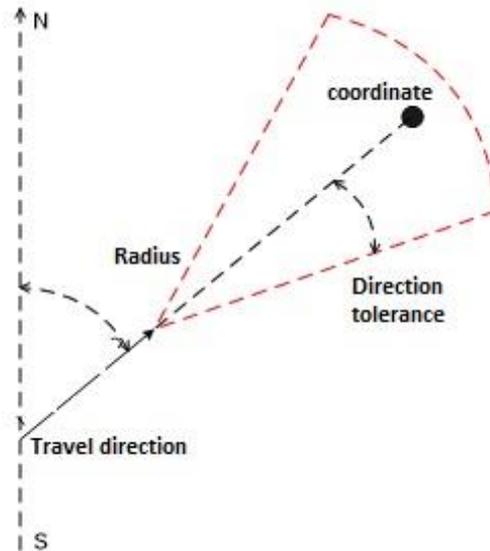


Figure 16 – Layout for identifying zones of sounds playing

## 8.1 Loudspeaker connection

### Connecting the loudspeakers to a built-in audio power amplifier

This method reduces the cost of installation and equipment costs. And also requires less space for installation. But it has limitations for the output power, the number and characteristics of the connected loudspeakers.

To connect the loudspeakers to an amplifier built in the tracker, you need to connect the required number of speakers with a wire (the total resistance of the simultaneously connected loudspeakers is not less than 8 ohms) and insert the common wire into the tracker self-clamping plug. The connection layout is shown in Figure 17.

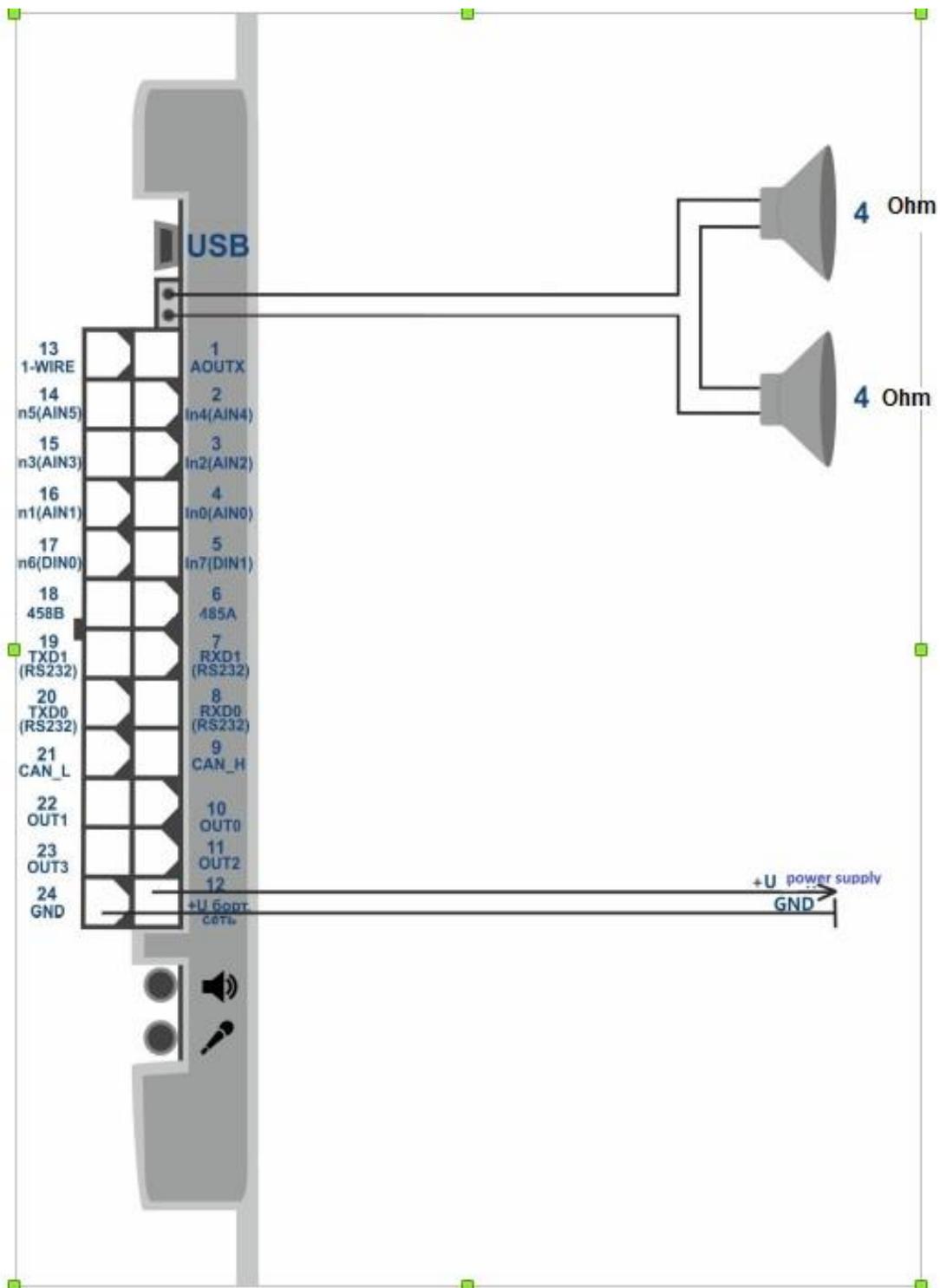


Figure 17 – Connection of loudspeakers to the amplifier built in the tracker (12 +U vehicle electrical system)

### Connecting the line audio output of the tracker to an audio power amplifier.

This method provides the freedom of choice in relation to the required output power and the number of loudspeakers because it is possible to select an amplifier with necessary characteristics. It also allows to use the previously installed voice announcement system, if the system allows the connection of external signal sources.

The input resistance of the audio power amplifier should be 10-50 kOhm. Schematic diagram of the connection is shown in Figure 18.

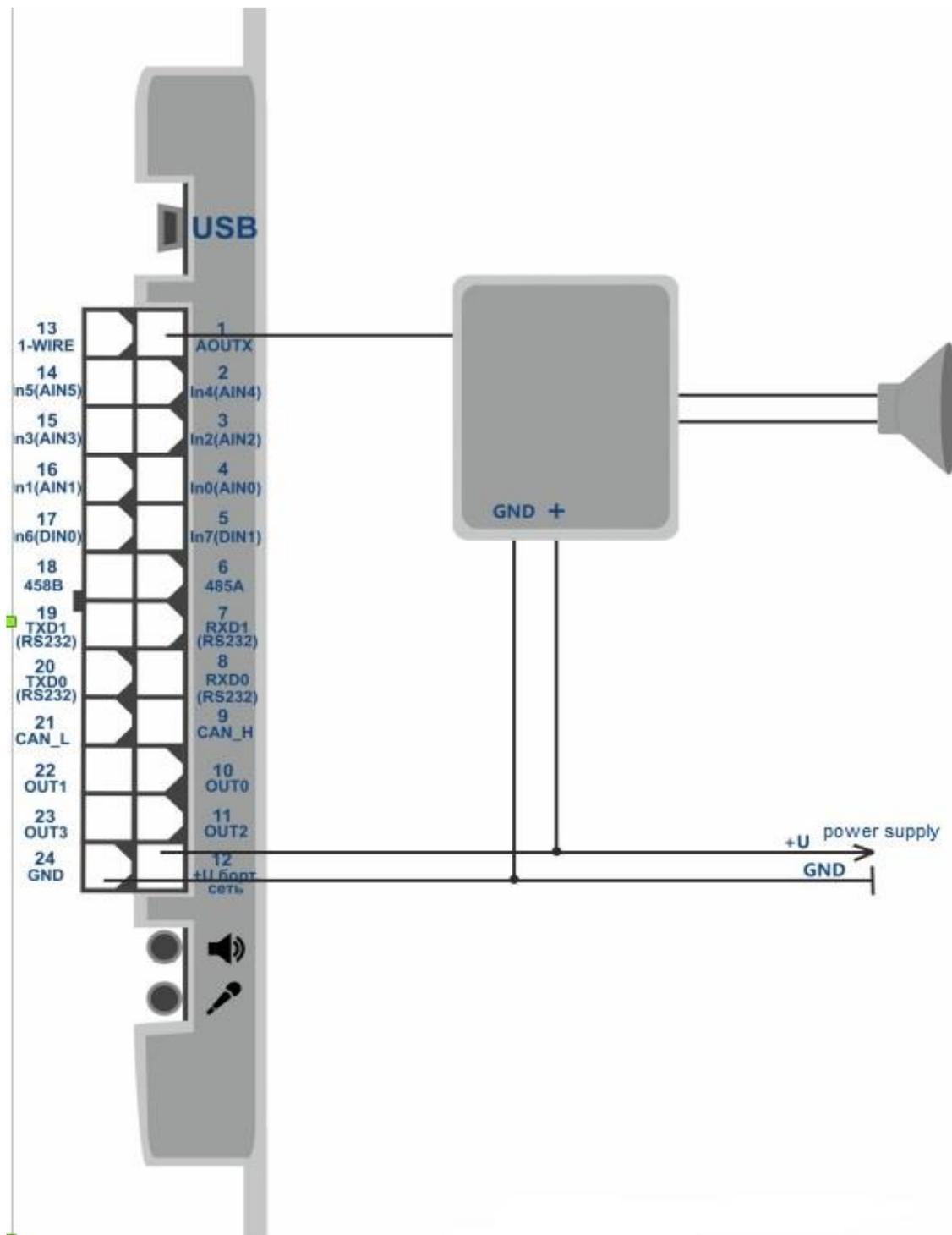


Fig 18 – Connection of amplifier to tracker line output

## 8.2 Routes planning

To plan routes, it is necessary to do the following:

1. Format microSD memory card into FAT32 file system. MicroSD memory cards up to 32 Gb are supported.

2. Make sure audio files format correspond to the following requirements:

Format: wav

Sampling frequency: 8kHz

Quantization depth: 16bit

Channels quantity: 1(mono)

Each parking points must have separate audio files.

If it is necessary the files must be converted to a required format.

3. Create catalogs (folders) in root directory on microSD memory card. Catalogs names must correspond to the roots names.

4. Record into these catalogs a set of audio files which correspond to catalog (root) requirements and name. In each root catalog you should create a text file with «route.txt» name. “Route.txt” file is needed to store geographical areas description for voice files reproduction. The length of catalogs and files names should not exceed 16 characters including extension. Names must contain only English alphabet characters and numbers.

5. Open «route.txt» file in text editor. Create descriptions of geographical areas and connect necessary audio files with each geographical area.

«Route.txt» file should be filled in the following format:

- One geographical area description should be in one line.
- geographical area is put as follows: latitude, longitude, direction, deviation in direction, radius, file name to be reproduced.
- Data are divided by semicolon without a space, there are no punctuation marks at the end of the line.
- Coordinates should be in the format: degrees with decimal parts divided by a point.
- Direction and deviation in direction is set by a whole number of degrees.
- Radius is set by a whole number of meters.
- Final line should be strictly empty.

Example of «route.txt» file is given in Figure 19.

Coordinates data can be received from dispatch program of the vehicle that have earlier passed this route.

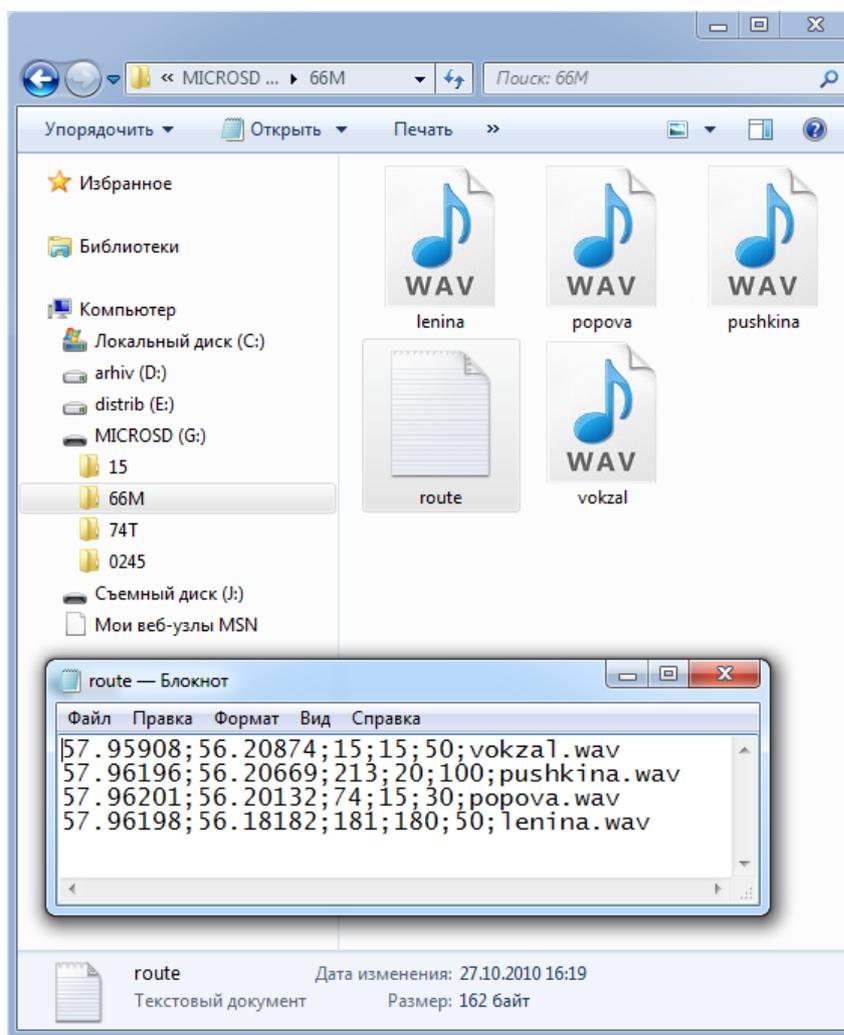


Figure19 – Example of «route.txt» file

### 8.3 Active route choice

To choose active route you should do the following:

- install into the tracker microSD memory card having being adopted as regards clause 8.2
- switch on the tracker;
- choose current route using «**ROUTE X**» command, where X is a route name;
- if there is a necessity, test how “Autoinformer” operates using «**ROUTETEST**» command. After the receipt of such a command, audio file, which have been indicated in the first line of «route.txt» file of active route, will be reproduced.

## **9 CAN bus (SAE J1939) and CAN-scanner**

### **9.1 Tracker connection to vehicle CAN-bus**

Tracker connection to Can -bus allows receiving data being transmitted via bus in FMS standard. For this purpose, you should connect corresponding line of vehicle CAN bus to the contacts CAN\_H, CAL\_L (9,21 contacts of MF-24F plug).

Use connection layout given in Figure 20 while connecting to diagnostic outlet.

If in the connection point to the bus between lines CAN\_H and CAL\_L there is resistance of ~120 Ohm (when ignition is disabled) then you should connect 120 Ohm resistance near the tracker between 9 and 21 contacts.

There is no need for additional resistor if resistance is ~60Ohm. As a rule, while connecting to diagnostic connector there is no need to use a resistor.

When connecting to Can bus use connection layout given on Figure 21.

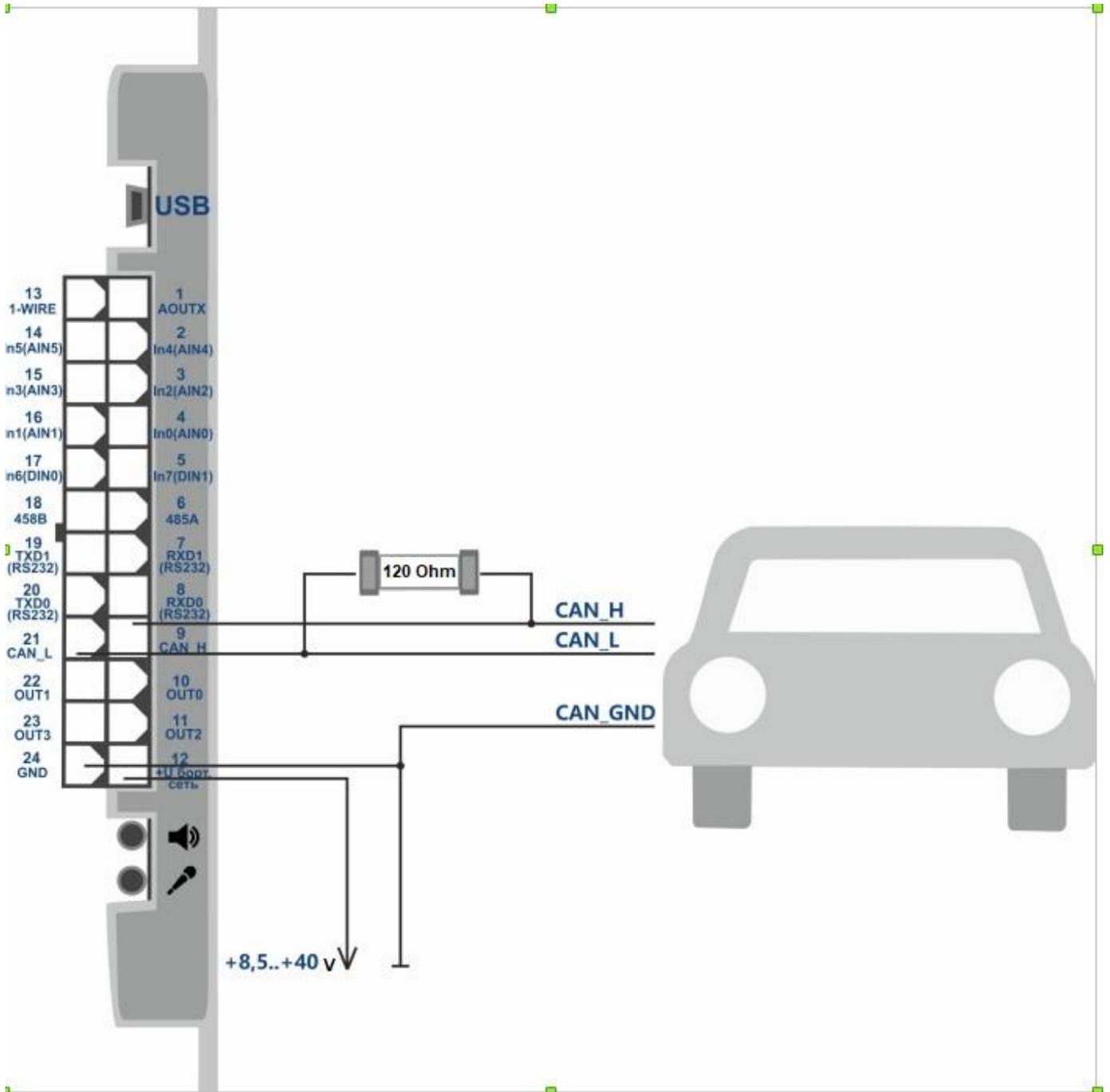


Figure 20 – Connection of tracker to CAN bus diagnostic connector (12 +U vehicle electrical system)

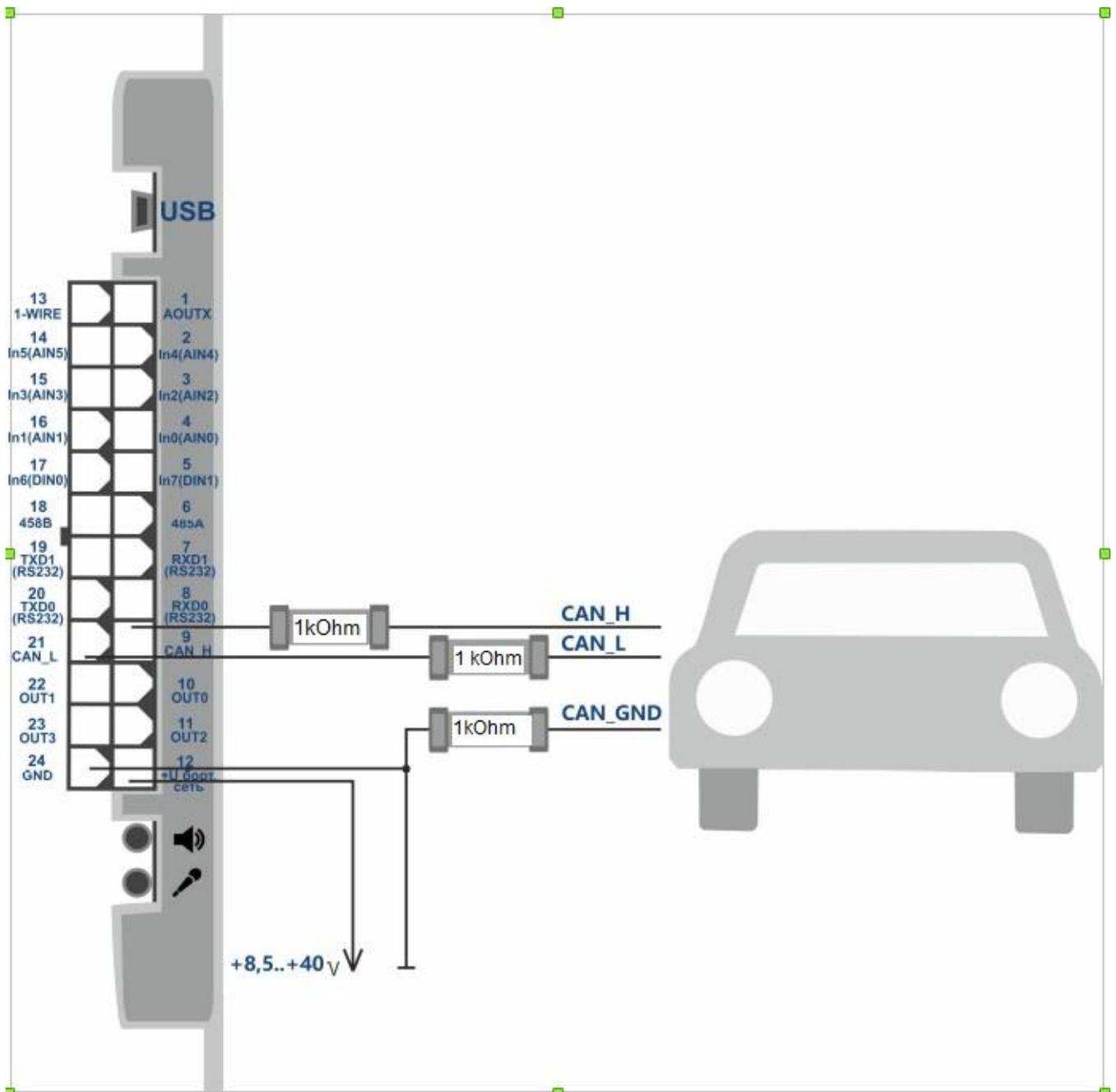


Figure 21 — Connection of tracker directly to Can bus (12 +U vehicle electrical system)

## 9.2 Can bus data receipt setting

Data received from CAN bus are transmitted in «CAN» data block. The transmission of such a block should be activated by «**PROTOCOL**» command or in a graphic interface of ADMConfigurator program. To set messages filter from CAN bus you should use ADMConfigurator» program of version 2.1 and higher.

To set messages receipt from CAN bus do the following:

- open division “Sensors” -CAN;
- press “Switch on CAN”;
- press «Apply settings».

When you do the above actions there will appear a window of data receipt settings from CAN bus. (see Figure 22).

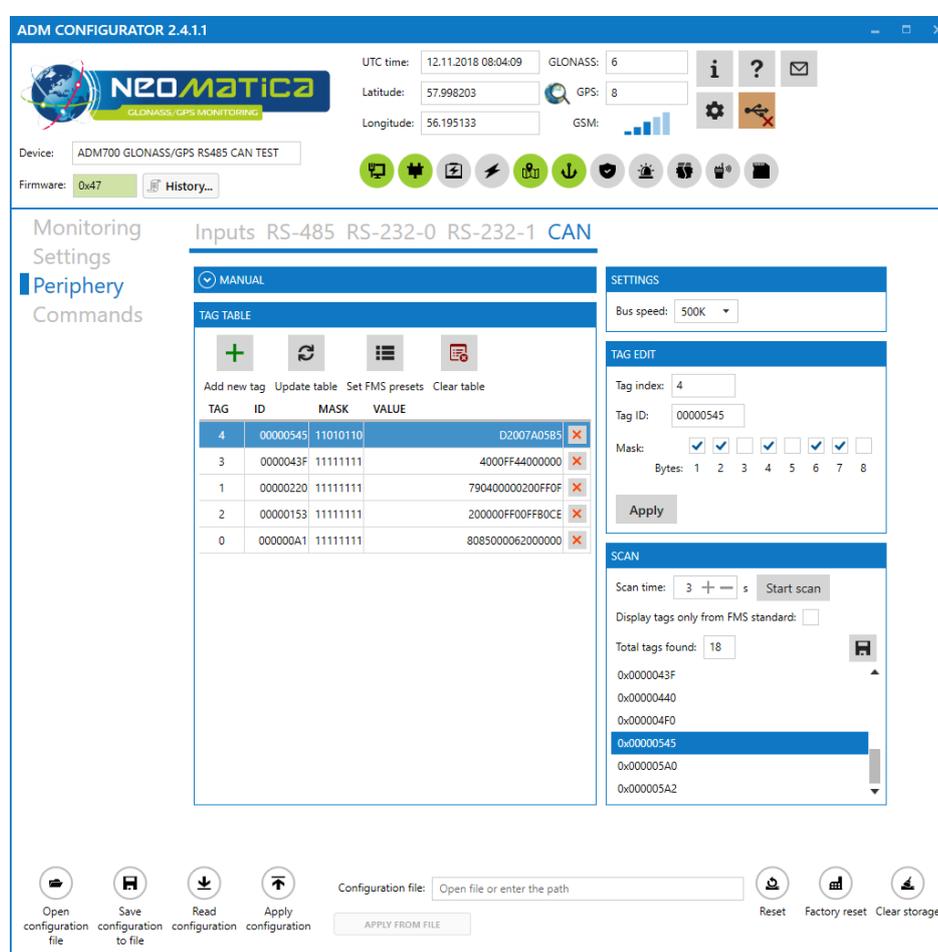


Figure - 22 Setting of messages filter for CAN bus

### 9.2.1 Manual setting

For manual setting do the following:

- install TAG field number “CAN” where value is transmitted to the server (0...15);
- enter message identifier (ID);

- install mask for needed data filtration;
- press button “Apply”;
- after having added all tags press “Apply settings”.

The tracker allows setting different tags for the same identifier but with different mask. Total number of saved data bytes is 37. To view data according to set tag use «**CANDATA**» command or press “Update table” button.

### **9.2.2 Pre-set parameters usage**

«FMS tags presetting» button upload pre-set parameters into the tags table. The set of pre-set parameters includes: fuel level, cooling liquid temperature, total fuel consumption, total engine working time, total usage of vehicle, speed. It is important to take into account that vehicle device of different manufactures differs and pre-set identifiers might not coincide with the identifier of a certain vehicle. In such a case CAN bus must be scanned.

### **9.2.3 Available data scanning**

After the scanning a whole list of identifiers being transmitted in a connected CAN bus will be created. You may choose any identifier from this list and add it for monitoring, having changed mask if necessary. For this you should do the following:

- start CAN bus scanning process by pressing “Scan” button (“Display only tags of FMS standard” filter keeps only those identifiers from the list that correspond to FMS standard).
- choose one of identified parameters;
- install “CAN” field number tag where value is transmitted to the server, (0...15);
- set a mask for filtering needed data;
- press «Apply» button.

## **10 Extra functions settings**

### **10.1 Cellular signal level transmission**

The tracker allows transmitting measured signal level of cellular network (in per cent) instead of any analogue input data. «GSMSIGNAL X» command allows choosing a number of analogue input. To do this you should activate IN\_A block data transmission (analogue inputs) by using «PROTOCOL» command or in a graphic interface of ADMConfigurator program.

### **10.2 Acceleration and braking values transmission**

To estimate driving quality the tracker allows transmitting speed change values (km/h) in 1

second, instead of any analogue input data.

Use «**ACCELALARM**» command to install analogue input number. Use «**PROTOCOL**» command to start IN\_A data block transmission (analogue inputs).

### 10.3 Alarm system

The tracker is equipped with three alarm types:

- When the vehicle gets beyond the arming point and exceeds the pre-set distance. If there are valid coordinates, the point where the arming command was received should be considered as the arming point. In the absence of such coordinates, the first valid coordinates received after accepting the arming command, will be considered as the arming point.
- When the vehicle exceeds the pre-set speed limit. This alarm is not used for controlling vehicle driving speed, but is used to record the fact of movement. Alarm parameters are set by the «**GPSGUARD**», «**GPSALARMTEXT**» commands when moving.
- When there is voltage within the pre-set range in the analogue input. For this function it is necessary to set SMS sending condition according to the event in the input by the «**INTRUESMS**» command and the message text by the «**INTRUESMSTEXT**» command.

When an alarming event occurs, the tracker can send up to four SMS messages to different phone numbers and activate the discrete output with the «**INTRUEOUT**» command.

For working with the list of alarm phone numbers, use the «**EVENTLISTADD**», «**EVENTLISTSHOW**», «**EVENTLISTCLEAR**» commands. Phone numbers might be duplicated in the list of authorized numbers but SMS messages, based on the events, are sent only to these numbers.

Arming and disarming are performed with the «**GUARD ON**», «**GUARD OFF**», «**ALARM OFF**» commands. It is possible to perform arming based on the event in one of the analog inputs. For this, it is necessary to select this input with the «**INGUARDMODE**» command and set a range for logical «1» and logical “0” therefor. The tracker will pass to the guard mode if the voltage values in this input are set within the logical “1” range.

Deactivation of such an arming mode is performed by the «**INGUARDMODECLEAR**» command.

## 11 Commands description

Table 4. Commands description

№	Command	Response	Parameters	Description
1	Name X example: Name bus8	Device Name 'X' example: Device Name 'bus8'	X – terminal name	Terminal name setting. The name might contain only Latin letters and numbers. The name length should not exceed 10 characters. The tracker name is added by an alarm SMS message.
2	ADD ME X,Y Example: ADD ME 1234  ADD ME 1234,2	PHOES (0)= (1)= (2)= (3)= Example: PHONES (0)= +79876543210 (1)= (2)= (3)= PHONES (0)= (1)= (2)= + 79876543210 (3)=	X – password by default "0" Y=0..3 – memory box number for the phone number saving. This parameter is not compulsory.	Authorization of the phone number, which the SMS was received from and saving it in the memory box Y. The command is necessary only for handling the terminal via SMS.
3	ADD ME X,Y (only via USB and GPRS) Example: ADD ME +7xxxxxxxxxx,1	PHOES (0)= (1)= (2)= (3)= Example: PHOES (0)= (1)= +7xxxxxxxxxx (2)= (3)=	X – phone number Y=0..3 – memory box number for the phone number saving.	Adding phone number, which is supposed to be used for terminal handling via SMS.
4	PHONES X Example: PHONES 1234	PHOES (0)= (1)= (2)= (3)=  Example: PHONES (0)= (1)= +79876543210 (2)= (3)=	X – password by default "0"	Request of authorized phone numbers list.

<b>№</b>	<b>Command</b>	<b>Response</b>	<b>Parameters</b>	<b>Description</b>
<b>5</b>	PASS X,Y Example: PASS 0,86974543	Pass=Y Example: Pass=86974543	X – the old password by default X=0. Y – new password	Changing password from old X to new Y. Password is the number from one to 8 characters.
<b>6</b>	STATUS	Example: ID=1 Soft=0x1A GPS=9291 Time=11:21:39 25.02.10 Nav=0 Lat=57.2359 Lon=56.2593 Speed=0.0 SatCnt=5 Stat=0x0000	Command without parameters	Current tracker condition ID – tracker number Soft – software version GPS – current number of data package Time – current GMT time and date Nav – coordinates validity Lat – latitude Lon – longitude Speed – speed SatCnt – number of satellites Stat – status
<b>7</b>	IMEI Example: IMEI	IMEI Example: IMEI 359587013832624	Command without parameters	IMEI request for GSM-module installed in the terminal. The command works 20- seconds after tracker switching on or rebooting.
<b>8</b>	SETGPRS0 X,Y,Z Example: SETGPRS0 internet.mts.ru, mts,mts	GPRS0: APN=X, user=Y, pass=Z Example: GPRS: APN=internet.mts.ru, user=mts, pass=mts	X – access point by default X= internet.beeline.ru; Y — login by default Y=beeline; Z – password by default Z=beeline.	APN parameters setting for SIM-card 0 (or SIM-chip 0). The command without parameters restores to the current settings GPRS for SIM-card.

№	Command	Response	Parameters	Description
9	SETGPRS1 X,Y,Z Example: SETGPRS0 internet.mts.ru, mts,mts	GPRS0: APN=X, user=Y, pass=Z Example: GPRS: APN=internet.mts.ru, user=mts, pass=mts	X – access point by default X=internet.beeline.ru; Y — login by default Y=beeline; Z – password by default Z=beeline.	APN parameters setting for SIM-card 1 (or SIM-chip 1) if available. The command without parameters restores to the current settings GPRS for SIM-chip.
10	SETHOST0 X,Y Example: SETHOST0 134,236,21,2,12300	HOST0=X,Y Example: HOST0=134,236,21,2:12300	X - IP address, Y — server port (Five comma-separated numbers)	Setting IP-address and server port, which the tracker is connected to for data transmission. The command without parameters restores to the current server address and port.
11	DN0 X:Y Example: SETHOST0 www.test.ru:1000	HOST0=X:Y Example: HOST0=www.test.ru:1000	X — server domain name Y — server port	Setting domain name and server port, which the tracker is connected to for data transmission. The command without parameters restores to the current server address
12	SIMPRIORITY Y	SIM PRIORITY Y	Y=0 – no priority Y=1 – priority of first SIM card Y=2 – priority of second SIM card by default, Y=0	Choosing of priority SIM card. Command without parameters requests current settings.
13	WAITTIME Y Example: WAITTIME 5	Wait Time = Y Example: Wait Time = 5	Y =0..30 –value in minutes By default Y=0	Setting timeframe between attempts to connect to the server via GPRS when there is no connection. Y=0 – sets automatic adjustment of track parameter.

<b>№</b>	<b>Command</b>	<b>Response</b>	<b>Parameters</b>	<b>Description</b>
<b>14</b>	RINGS X Example: RINGS 2	NGS=X Example: RINGS=2	X=1..10 — Number of calls before automatic answer at a voice call X=0 – automatic answer is disabled, value by default	Automatic answer setting at a voice call. Command without parameter requests current setting
<b>15</b>	VOLUME X,Y Example: VOLUME 75,10	VOLUME=X,Y Example: VOLUME=75,10	X=0..100 – loudspeaker loudness value Y=0..15 – microphone sensitivity	Setting of loudspeaker loudness and microphone sensitivity. Command without parameter restores current setting.
<b>16</b>	ERASE FLASH	ERASE FLASH	Command without parameters	Erasing of all data packets stored in the memory. When such a command is being done current number of data packet is being reduced to zero and the tracker is being rebooted.
<b>17</b>	ERASE EEPROM	ERASE EEPROM	Command without parameters	Restoring of manufacturer settings and tracker rebooting.

№	Command	Response	Parameters	Description
18	PERIOD X,Y Example: PERIOD 20,20	PERIOD min=X, max=Y Example: PERIOD min=20, max=120	X=10..3600 – timeframe for recording travel time in seconds, by default X=60. Y=10..3600 – timeframe for recording parking time in seconds, by default Y=300. X value should be less than Y	Setting the timeframe for recording in data packets memory during traveling and parking. The command without parameters restores to current settings.
19	OUTPUT X,Y Example: OUTPUT 1,1	OUTPUT(3..0) = Example: OUTPUT(3..0) = 0010	X=0..3 – output number. Y=1 – output enabled. Y=0 – output disabled По умолчанию Y=0.	Tracker outputs controlling. The command without parameters restores to current settings.
20	LLSTOIN X,Y Example: LLSTOIN 2,34	LLS Y CONNECT TO INPUT X Example: LLS 34 CONNECT TO INPUT 2	X=0,..,5 – input number X=255 – function disabled Y=0,..255 – address of the sensor which data should be transmitted from	Input number setting instead of which data will be transmitted from LLS Omnicomm sensor

№	Command	Response	Parameters	Description
21	INPUT X Example: INPUT 3	INPUTX = 0 Example: INPUT3 = 2374	X=0..7 – input number	Viewing of current value in the unit input. Current voltage values are displayed in mV, ( Hz,units).
22	FUEL	FUEL F0=234, T0=21; F1=871, T1=20; F2=0, T2=0;		Current readings request from a fuel level sensor connected based on RS-485 interface.
23	IMPULSE X,Y Example: IMPULSE 0,1	IMPULSE X,Y Example: IMPULSE 0,1	X=0,1 — operation mode of the discrete (pulse) input DIN0; Y=0..2 - operation mode of the pulse input DIN1.	Setting operation modes for pulse inputs X=0 (Y=0) — input activated in frequency meter mode X=1 (Y=1) — input activated in flowmeter mode X=1 и Y=2 — input IN6 activated in differential flow meter mode, id est the fuel supply flowmeter is connected to the input IN6, and the backward fuel supply flowmeter – to the input IN7. In addition, readings difference is transmitted via the IN_D0 input and flowmeter readings from the backward fuel supply – via IN1_D1. X=3 (Y=3) — input activated in discrete mode with pull-up to the plus.
24	INFILTER X,Y Example: INFILTER 1,1000	INPUT X FILTER TIME Y Example: INPUT 1 FILTER TIME 1000	X= 0..5– input number Y =20..60000 – values in milliseconds By default Y=5000	Setting an averaging interval according to input. Voltage value according to input is averaged within the set time.

№	Command	Response	Parameters	Description
25	EventListAdd X Example: EventListAdd 79xxxxxxxx	Number was added to the event list Example: Number was added to the event list	X – added phone number in «7xxxxxxxxx» format	Adding phone number in the list for sending SMS when the event occurs. Not more than 4 phone numbers are stored.
26	EventListClear	Event list was cleared		Removing all numbers from the list of phone numbers for SMS sending
27	EventListShow	Event list: (0)=779876543210 (1)=79876543211 (2)=79876543212 (3)=		Viewing the list of phone numbers for sending SMS messages
28	InTrue Y,Xmin,Xmax Example: InTrue 5,10000,30000	Input Y True Xmin, Xmax Example: Input 5 True 10000..30000	Y= 0..5 – input number; Xmin – minimum range limit, mV; Xmax – maximum range limit, mV; Xmin<=Xmax Y=0, Xmin =[0..8,8V], Ymax =[0..5V]. Y=1, Xmin =[0..17,5V], Xmax =[0..17,5V] Y=2..5, Xmin =[0..35V], Xmax =[0..35V]	Voltage range of the logical “1” in analogue input. Values by default Y=0, Xmin =0V, Xmax =0V Y=1, Xmin =0V, Xmax =0V Y=2..5, Xmin =0V, Xmax =0V

№	Command	Response	Parameters	Description
29	InFalse Y,Xmin,Xmax  Example: InFalse 5,10000,30000	Input Y False Xmin,Xmax Пример: Input 5 False 10000..30000	Y== 0..5 – input number; Xmin – minimum range limit, mV; Xmax – maximum range limit, mV; Xmin<=Xmax Y=0, Xmin =[0..6,3V], Ymax =[0..6,3V]]. Y=1, Xmin =[0..13,6V], Xmax =[0..13,6V] Y=2..5, Xmin =[0..35V], Xmax =[0..35V]	Voltage range of the logical “0” in analogue input. Values by default  Y=0, Xmin =0V, Xmax =0V Y=1, Xmin =0V, Xmax =0V Y=2..5, Xmin =0V, Xmax =0V
30	InTrueSmsText X,Y	Input Y TrueSms=X	Y=0,..,5 – input number X – text message no longer than 10 characters	Sending SMS text t when input voltage is in the logical “1” range.
31	INTRUESMS Y,X  Example: InTrueSms 1,1 InTrueSms 3	Input Y send true sms X  Example: Input 1 send true sms 1 Input 3 send true sms 0	Y=0..5 – input number; X=0 – ban for sending SMS X=1 – permission for sending SMS in guard mode, X=2 – permission for sending SMS in any mode.	Permission for SMS sending when in the input the voltage is in the logical “1” range. Command without X parameter restores to the current SMS sending setting.

№	Command	Response	Parameters	Description
32	INTRUEOUT Y,X,Z  Example: InTrueOut 0,3,2	Input Y TrueOut X Mode Z  Пример: Input 0 TrueOut 3 Mode 2	Y=0..5 – input number; X=0..3 – output number; Z=0 – output deactivated Z=1 – output activated in guard mode, Z=2 – output always activated	Binding output to the event in input.
33	InGuardMode X  Example: InGuardMode 0	Input X on guard mode  Example: Input 0 on guard mode	X=0..5 – input number	Setting the input number for guard mode activation, the command without X parameters restores to the current input number for guard mode activation. No input is set by default for guard mode activation.
34	InGuardModeClear	no input in guard mode		Clearing input number for the activated guard mode.
35	ININFO Y  Пример: ININFO 2	Example: Input 2: InTrue 8000..15000, InFalse 0..3000, InGuardMode 0, InTrueSms 2, SmsTxt 'ALARM'	X=0..5 – input number	Information displaying about input settings
36	Guard on	Guard On		Arming
37	Guard off	Guard Off		Disarming
38	Alarm Off	Alarm Off		Alarm deactivation

<b>№</b>	<b>Command</b>	<b>Response</b>	<b>Parameters</b>	<b>Description</b>
<b>39</b>	GPSTGuard X,Y,Z  Example: GPSTGuard 1,6,70	GPSTguard=X, V=Y, L=Z  Example: GPSTguard=1, V=6, L=70	X=0 – off, X=1 – on; Y=5..25 – speed, km/h; Z=50..1000 – distance in meters	Notification activation during vehicle movement when it is in guard mode and when speed limits are exceeded. Command without parameters restores to the current settings. Default values Y=5, Z=100.
<b>40</b>	GPSTAlarmText X  Example: GPSTAlarmText The car moves	GPSTAlarmText 'X'  Example: GPSTAlarmText 'The car moves'	X – text message not exceeding 20 characters	Setting a text message transmitted during the movement of the vehicle in guard mode.
<b>41</b>	MODE X  Example: MODE 1	MODE X  Example: MODE 1	X=0 – combined system X=1 – GLONASS system X=2 – GPS system	Setting system which will solve navigation task. Command works only with GPS/GLONASS trackers.
<b>42</b>	RELOAD	Reloading...		Complete reboot of the tracker with GLONASS/GPS receiver reboot
<b>43</b>	RESET	Reloading...		Quick reboot of the tracker without GLONASS/GPS receiver deactivation
<b>44</b>	GPS3D  Example: MODE 1	GPS3D=X  Example: MODE 1	X=0 – mode 2D, X=1 – mode 3D, by default X=1.	Setting GLONASS/GPS receiver mode. In 3D mode all improperly determined coordinates will be transmitted as invalid.

<b>№</b>	<b>Command</b>	<b>Response</b>	<b>Parameters</b>	<b>Description</b>
<b>45</b>	SATHDOP X,Y Example: SATHDOP 3,5.5	MinSat=X MaxHDOP=Y  Example: MinSat=3 MaxHDOP=5.5	X=1..10 – the minimum number of satellites Y=0..25 – the maximum HDOP. By default, X=4, Y=1.	Setting the limit for the maximum HDOP with the minimum number of satellites. All coordinates with HDOP bigger than Y, and when the number of satellites is fewer than X, they will be transmitted as invalid.
<b>46</b>	MAXHDOP Example: MAXHDOP 5.5	MAXHDOP=X Example: MAXHDOP=5.5	X – the maximum HDOP value By default, X=50.0	Setting the limit for the maximum HDOP. All coordinates with HDOP bigger than the preset value will be transmitted as invalid.
<b>47</b>	ROUTE X Example: ROUTE 15T	ROUTE X Example: ROUTE '15T'	X – Catalog name with the route	Choosing of a current route for autoinformers
<b>48</b>	ROUTOFF	ROUTOFF		Switching off autoinformers function
<b>49</b>	ROTETEST	ROUTETEST playing...	Command without parameters	Reproducing of first active route audio file.

№	Command	Response	Parameters	Description
50	PROTOCOL X  Example: PROTOCOL 60	PROTOCOL X  Example: PROTOCOL 60 (NAVIGATION DATA+OUTS+IN_A+IN_D+FUEL)	X – number determining protocol format  X=1 - protocol ADM-5; for the ADM-6 protocol the number X is defined by the sum of numbers corresponding to necessary blocks in the protocol.	Setting of protocol type and format.  NAVIGATION DATA = 0 (basic data), OUTS = 4 (outputs, events by inputs), IN_A = 8 (analogue inputs), IN_D = 16 (pulse inputs), FUEL = 32 (fuel level sensors), ODOMETR = 128 (virtual odometer value),
51	SETPROTOCOL X Example: SETPROTOCOL 0	SETPROTOCOL X Example: SETPROTOCOL 0	X – type of protocol data transmission to the server  X=0 - ADM protocol. X=1 - EGST protocol.	Setting of protocol type.
52	NUMBER X	IDN 1234 IMEI 354123456789012	X – phone number in «7xxxxxxxxxxx» format	IMEI and device number request  The answer is sent via SMS to the indicated phone number

<b>№</b>	<b>Command</b>	<b>Response</b>	<b>Parameters</b>	<b>Description</b>
<b>53</b>	INSTATIC X Example: InStatic 3	Input X for static Example: Input 3 for static	X=0..5– input number, X=255 – function disabled,	Setting input number for Static navigation mode activation. Command without parameter X restores to the current setting. No input is set by default for Static navigation mode activation.
<b>54</b>	STATICTOIN X Example: STATICTOIN 1	STATICTOIN X Example: STATICTOIN 1	X=0..5 – input number X=255 – function disabled	Choosing of analogue input which data will be being substituted by the transmission of “coordinates freezing” state.
<b>55</b>	TEMPTOIN X Example: TEMPTOIN 2	TEMP CONNECT TO INPUT X Example: TEMP CONNECT TO INPUT 2	X=0,..,5 – input number X=255 — sensor is disabled	Setting of input number which data will be being substituted by the transmission of inner temperature sensor data.
<b>56</b>	MAXACC X Example: MAXACC 9	MAX AAC=X Example: MAX AAC=X	X=3,..,255 –conditional vibration level.	Setting of vibration level below which the coordinates are being frozen. Changing of this parameter might cause improper tracker operation.
<b>57</b>	SD	SD ON SD OFF		The command allows to define if a memory card in the device works well at valid settings.
<b>58</b>	CANDATA X Example: CANDATA 1	CANDATA X Example: CANDATA_1 = 1F	X – tag number	Displaying of CAN tag value.

№	Command	Response	Parameters	Description
59	TRACK X,Y,Z,A  Example: TRACK 5,15,500,10	TRACK X,Y,Z  Example: TRACK 5,15,500	X=2..20 – minimum speed Y=5..180 – angle in degrees Z=50..5000 – distance in meters A=0..25 – speed change in km/h/s By default X=3, Y=10, Z=500, A=25	Setting the route drawing quality. A new point is put on the route if the travel direction changes more than by the angle Y or the distance to the previous point is bigger than Z or speed change per second is more than A. This mechanism is deactivated when the speed is fewer than X so that there wouldn't be too many points at low speed values. This parameter change might cause improper function of the tracker
60	STATMASK X Example: STATMASK 1	STATMASK X Example: STATMASK 1	X – the number determining events which occurrence will initiate formation of extra packets. It is defined by the sum of mask values (see the Appendix A). By default X=65535 (all events are included).	Setting device status mask for reducing traffic from the tracker to the server.
61	OUTPUT X Example: OUTPUT 1	OUTPUT X Example: OUTPUT 1	X=1 – output is active (linked to the ground) X=0 – output is not active (disconnected from the ground). By default, =0.	Handling tracker output. Command without parameters restores to the output current settings.

№	Command	Response	Parameters	Description
62	COM9 X Example: COM9 2	COM9 X Example: COM9 2	X=0..100 – the number of points recorded by the tracker after stopping but before setting parking mode. By default, X=0	Short-term parkings recorded by means of extra points saving after vehicle stop and based on the frequency set for movement by PERIOD command.
63	PIN0 X Example:: PIN0 1234	PIN0=X Example:: PIN0=1234	X – PIN code	Setting SIM-card PIN code. Command without parameters does not display current code.
64	PIN1 X Пример: PIN1 1234	PIN1=X Пример: PIN1=1234	X – PIN код.	Setting SIM-card PIN code. Command without parameters does not display current code.
65	USB X Example:: USB 1234	PASS OK Example:: PASS OK	X – access password for the tracker set by the PASS command	Entering temporary access password via configurator. Access is authorized before reboot
66	DSPTOIN X Example: DSPTOIN 2	DSPTOIN X Example: DSPTOIN 2	X=0,...,5 – input number; X=255 – input number is not defined (value is set by default )	Setting of input number which data will be substituted by transmission of the vehicle state data.

<b>№</b>	<b>Command</b>	<b>Response</b>	<b>Parameters</b>	<b>Description</b>
<b>67</b>	CARDTOIN X,Y Example: CARDTOIN 2,0	CARDTOIN X,Y Example: CARDTOIN 2,0	X=0,..,5 – input number; X=255 – input number is not defined (value is set by default ); Y=0,..,3 – output number; Y=255 – output data is not defined (value is set by default).	Setting of input number which data will be substituted by data transmission of card number being attached to Matrix III RD-All reader and setting of output number which will be being activated if the card is absent.
<b>68</b>	UPDATE	Start update		Firmware update via GPRS channel
<b>69</b>	PSTATIC X Example: PSTATIC 1	PSTATIC X Example: PSTATIC 1	X=1 — program statics function enabled; X=0 - program statics function disabled	Coordinates freezing function on/off during the parking by the program method.
<b>70</b>	MODE X Example: MODE 1	MODE X Example: MODE 1	X=0 – GLONASS+GPS, X=1 – GLONASS, X=2 – GPS	Choosing from navigation system to define location.
<b>71</b>	ODM	ODM 132168181		Value of active odometer in meters
<b>72</b>	TRAFFIC X Example: TRAFFIC 0	TRAFFIC X Example: TRAFFIC 0	X=0..10. X=0 – without grouping, online monitoring	Setting the parameter defining data grouping to the server before sending for saving traffic between the tracker and the server.
<b>73</b>	LLS485 X,Y,Z Example: LLS485 3,20,55	LLS485 X,Y,Z Example: LLS485 3,20,55	X,Y,Z – LLC sensors addresses connected to the tracker via the RS485 interface	Installation of LLC sensors addresses

<b>№</b>	<b>Command</b>	<b>Response</b>	<b>Parameters</b>	<b>Description</b>
<b>74</b>	ESCORT X Example: ESCORT 2	ESCORT X Example: ESCORT 2	X=0..5 – input number X=255 – input number is not identified (default value).	Installing the analogue input number which data will be replaced by information read from the ESCORT tags reader
<b>75</b>	SDLOG X Example: SDLOG 1	SDLOG X Example: SDLOG 1	X=1 –Usage of microSD card as a black box X=0 – function is disabled, values by default	Function of track saving in the memory of microSD card. Tics server.
<b>76</b>	SERIAL X Example: SERIAL 1	SERIAL X Example: SERIAL 1	X=1 – send data to the server as regards time X=0 – sending data to the server when it is relevant (default value).	Setting of data uploading order from the black box to the telematics server. When using a memory card as a black box the uploading order is only on time. (X=1).
<b>77</b>	CAMENABLED X Example: CAMENABLED 1	CAMENABLED X Example: CAMENABLED 1	X=1 – enabled; X=0 – disabled. (value by default).	Camera switching on/off
<b>78</b>	CAMUPLOAD X Example: CAMUPLOAD 1	CAMUPLOAD X Example: CAMUPLOAD 1	X=1 – enabled; X=0 – disabled. (value by default).	Enabling/disabling of photos uploading onto server
<b>79</b>	CAMPERIOD X Example: CAMPERIOD 60	CAMPERIOD X Example: CAMPERIOD 60	X=1 –enabled; X=0 – disabled (value by default).	Period setting of the photos saving in the memory card, seconds.
<b>80</b>	CAMUPLOADSIZE Example: CAMUPLOADSIZE	CAMUPLOADSIZE Example: CAMUPLOADSIZE 20		Displays the number of not uploaded photos, pcs.
<b>81</b>	CAMUPLOADNUL Example: CAMUPLOADNUL	CAMUPLOADNUL Example: CAMUPLOADNUL		Marking of all photos as uploaded ones

<b>№</b>	<b>Command</b>	<b>Response</b>	<b>Parameters</b>	<b>Description</b>
<b>82</b>	CAMEVENT X,Y,Z Example: CAMEVENT 0,2,20	CAMEVENT X,Y,Z Example: CAMEVENT 0,2,20	X – analog input number. Y – number of photos in a series. Z – time period between photos	Setting of photos taking when event occurs on set analog input. Setting of photos numbers in a series, setting of time period between photos in a series.
<b>83</b>	CCID X Example: CCID 0	CCID X,xxxxxxxxxxxxxxxxxxx Example: CCID 0,xxxxxxxxxxxxxxxxxxx	X=0..1 number of the holder of sim card	Request of CCID Sim -card 0 и Sim-card 1.
<b>84</b>	SET232 X,Y		X – port number Y – mode	Choosing of operation mode of RS-232 0 and RS-232 1 port.
<b>85</b>	EGTSEVENTSRC X,Y Example: EGTSEVENTSRC 2,13	EGTSEVENTSRC X,Y Example: EGTSEVENTSRC 2,13	X=0.5 - input number Y=value put in the src. field	Installing the input number, which will initiate formation of an extraordinary packet with the filled SRC field when an event occurs thereon.
<b>86</b>	SPEEDALARM X,Y Example: SPEEDALARM 0,70	SPEEDALARM X,Y Example: SPEEDALARM 0,70	X=0 – activated output number Y – speed, km/h	Installing the speed limit activating the output
<b>87</b>	ACCELALARM X,Y,Z,A Example: ACCELALARM 3,15,10,0	ACCELALARM X,Y,Z,A Example: ACCELALARM 3,15,10,0	X=0.5 – input number, which data are replaced by acceleration and braking; Y – braking limit activating the output; Z – acceleration limit activating the output; A – activated output number	Installing the analogue input number, which data will be replaced by acceleration and braking (speed change (km/h) per 1 second). Installing acceleration and braking limits activating the tracker output.

<b>№</b>	<b>Command</b>	<b>Response</b>	<b>Parameters</b>	<b>Description</b>
<b>88</b>	CALLANSWERTIME X Example: CALLANSWERTIME 30	CALLANSWERTIME X Example: CALLANSWERTIME 30	X=0 – function disabled X=1..255 – time in seconds	Installing answer timeout after which the incoming call is rejected.
<b>89</b>	MAKECALLTIME X Example: MAKECALLTIME 60	MAKECALLTIME X Example: MAKECALLTIME 60	X=0 – function disabled X=1..255 – time in seconds	Installing answer timeout after which the outgoing call is rejected.
<b>90</b>	ADM20 X,Y,Z Example: ADM20 2,1,6	ADM20[X] Y,Z ready Example: ADM20[2] 1,6 ready	X=0..4 number; Y=address on can bus RS-485; Z=operation mode	Setting of sequence number and operation mode for ADM20 reader.
<b>91</b>	ADM20MODE X,Y,Z,A,B Example: ADM20MODE 0,2,0,2,0	ADM20MODE[X] Y,Z,A,B enabled Example: ADM20MODE[0] 2,n/a,2,n/a enabled	X=0..4 setting reader number; Y=0..2 setting mode number; Z= card checking period; A=0..5 analogue input number; B=output number	Setting of chosen reader operation mode. Setting card checking period, analogue input choosing which data will be substituted by transmission of card number/tag.
<b>92</b>	ADM20OUTMODE X,Y Example: ADM20OUTMODE 1,0	ADM20OUTMODE 0:0, 1:0, 2:0, 3:0, 4:0 Example: ADM20OUTMODE 0:1, 1:0, 2:0, 3:0, 4:0	X — ADM20 reader number. Y=0...1 the condition in which tracker output will be when a card is detected	Setting of tracker output condition when detecting a card by ADM20 reader.
<b>93</b>	TACHOENABLED X,Y Example: TACHOENABLED 1,2	TACHOENABLED X,Y Example: TACHOENABLED 1,2	X=0 tachograph VDO; X=1 tachograph SHTRICH-M; X=0 RS-232_0 port; Y=1 RS-232_1 port; Y=2 RS-485 port.	Choosing type and port of the tachograph being connected.

<b>№</b>	<b>Command</b>	<b>Response</b>	<b>Parameters</b>	<b>Description</b>
<b>94</b>	TACHOGETDDD X Example: TACHOGETDDD 1	TACHOGETDDD start upload Example: TACHOGETDDD start upload	X- slot number of the driver's card	DDD file uploading from the tachograph into the monitoring system via GPRS connection.
<b>95</b>	TACHOGETCARDNUMBER X Example: TACHOGETCARDNUMBER 1	TACHOGETCARDNUMBER X: .... Example: TACHOGETCARDNUMBER 1: ....	X- slot number of the driver's card	Request of driver's card number
<b>96</b>	TACHOTRCARDNUMBER X Example: TACHOTRCARDNUMBER 1	TACHOTRCARDNUMBER X Example: TACHOTRCARDNUMBER 1	X=0-function disabled X=1-function enabled	Switching on transmission of driver's card number instead of data from AIN4 and AIN5 analogue inputs.
<b>97</b>	TACHOTRODOMETR X Example: TACHOTRODOMETR 1	TACHOTRODOMETR X Example: TACHOTRODOMETR 1	X=0-function disabled X=1-function enabled	Switching on the replacement of in-built odometer data to the tachograph odometer data.
<b>98</b>	EUROSENSEENABLED X0,Y0,X1,Y1 Example: EUROSENSEENABLED 0x00,1,0x01,3	EUROSENSEENABLED X0:Y0, X1:Y1 Example: EUROSENSEENABLED 0x00:1,0x01:3	X – requested data code; Y – requested field	Including EUROSENSE DELTA RS sensor support, transmitted data set installation
<b>99</b>	EUROSENSVALUES		Command without parameter	Displaying of set EUROSENSE sensor parameters value

<b>№</b>	<b>Command</b>	<b>Response</b>	<b>Parameters</b>	<b>Description</b>
<b>100</b>	EUROSENSADDRESS X Example: EUROSENSADDRESS X Example: EUROSENSADDRESS 1	EUROSENSADDRESS X Example: EUROSENSADDRESS X Example: EUROSENSADDRESS 1	X – sensor address on can bus RS-485; X=255 — switching off sensor interrogation and parameters transmission to the server	Installing of EUROSENSE. DELTA RS sensor address or switching off sensor interrogation and parameters transmission to the server
<b>101</b>	OWTHERMOENABLED X Example: OWTHERMOENABLED 1	OWTHERMOENABLED X Example: OWTHERMOENABLED 1	X=0-function disabled X=1-function enabled	Switching on sensors data transmission instead of analogue inputs data.
<b>102</b>	OWTHERMO X Example: OWTHERMO 1	OWTHERMO X: temp Example: OWTHERMO 1: 25.31	X=0...7 – sequence sensor number	Displaying of current temperature sensor value.
<b>103</b>	OWINSPECT	OWINSPECT 0:(Thermometer - DS1820 ) 1:(Thermometer - DS18B20 )	Command without parameter	Displaying of all devices of 1-Wire bus
<b>104</b>	OWCONFIG	OWCONFIG 0:(Thermometer - DS1820 ) 1:(Thermometer - DS18B20 )	Command without parameter	Giving sequence numbers for all devices on 1-Wire bus.
<b>105</b>	OWCONFIGINFO		Command without parameter	Displaying of all devices on 1- Wire can and giving- them sequence numbers.

## 12 Tracker software upgrading

Tracker software upgrade (firmware) can be performed through the USB-interface by means of configuration program or via GPRS-channel.

### 12.1 Tracker software upgrading via USB

If the computer is connected to the Internet network then the configuration program checks the valid firmware version in the upgrade server and if necessary, downloads the firmware file.

To upgrade firmware, do the following:

- after having switched off the external power, connect USB cable (miniUSB/USB-A) to the tracker and Personal computer USB port;
- supply the power to the tracker from the vehicle circuit or a laboratory power source;
- launch “ADMConfigurator” program on personal computer;
- if a more recent firmware version than the one installed on the tracker is detected, “ADMConfigurator” program will inform you of its presence;
- press “Upgrade available”;
- in the opened tab “Notifications” press “firmware upgrade via USB”;
- after being upgraded, the tracker will be rebooted and become available for work.

**WARNING!** Don't switch the tracker power off when upgrading the tracker firmware until the tracker is detected by the setting program. Otherwise there is a risk of damaging the software which recovery can be performed only in the manufacturer's office.

### 12.2 Tracker software upgrading via USB with a firmware file

**Firmware file should be requested in technical support.**

To upgrade the firmware via the USB interface with a firmware file, do the following:

- after having switched off the external power, connect USB cable (miniUSB/USB-A) to the tracker and Personal computer USB port;
- supply the power to the tracker from the vehicle circuit or a laboratory power source;
- launch “ADMConfigurator” program on personal computer;
- after having connected the terminal to the program, open the “Settings” section in the “Device” tab, press “Flash the file”;
- press “Yes” in the popup;
- drag the firmware file in the respective field in the configurator window;
- after the firmware is upgraded, the tracker will be rebooted and become available for work.

**WARNING!** Don't switch the tracker power off when upgrading the tracker firmware until the tracker is detected by the setting program. Otherwise there is a risk of damaging the software which recovery can be performed only in the manufacturer's office.

### **12.3 Tracker software upgrade via GPRS**

To upgrade the tracker software via GPRS, it is necessary to install an active SIM-card in the tracker, set the user's access point and mobile operator password (APN, user, pass). Otherwise, the tracker will have remained in the mode of firmware uploading from the server until connection attempts are over. The upgrading process will start after the tracker receives «**UPDATE**» command via one of the possible channels USB, GPRS, SMS. After having received the «**UPDATE**» command the tracker connects to the upgrade server and uploads the relevant firmware. After a successful upgrade the tracker passes to the standard operation mode with the access point and server address settings installed before upgrading. The remained settings should be checked after upgrade and if necessary, re-install them. Depending on the GSM-network the upgrading process takes on average from 2 to 5 minutes. If the upgrading upload is not possible, the tracker will continue working with the existing software.

## **13 Storage and transportation requirements**

Trackers should be stored in a warehouse at a temperature of +5°C to +40°C and relative humidity at most 85 %.

After tracker transportation in sub-zero temperatures they should be stored at room temperature within 24 hours.

## **14 Warranty**

The manufacturer guarantees the tracker proper function within 12 months from the day of its sale if consumer meets all the requirements and follows all the rules of transportation, storage, installation and handling.

The warranty does not cover:

- a tracker with mechanical damages and defects (cracks and chips, dents, signs of impacts, etc.) caused by consumer as a result of handling, storage and transportation rules violation. When there are signs of oxidation or other proofs of liquid penetration in the device housing;
- a tracker without housing;
- a track with signs of repair performed beyond the manufacturer's service center;

- a tracker with signs of electrical and/or other damages caused as a result of unacceptable changes in external power electrical system parameters or improper use of the tracker;
- a tracker disabled because of an unauthorized software upgrade.

The device software is licensed, terms related to the manufacturer's limited liability in the framework of the License Agreement are provided at the web site <http://en.neomatica.ru/upload/files/license.pdf>

## 15. Marking and packaging

Marking is placed on the tracker housing. The trackers are packed in individual boxes, which protect them during transportation and storage. Multipack is possible.

## 16 Disposal

Device recycling is performed according to the federal and regional norms and requirements.

## 17 Scope of supply

Table 5. Scope of supply

Name of Item	Quantity	Serial number	Note
Terminal ADM700 3G			
MF-24F connector with wires for supplying power and sensors			
Data sheet			

*Manufacturer: «NEOMATICA» LLC  
614087, Russia, Perm, 24A Malkova Str. Office 6  
Contact phone +7 (342) 2-111-500.  
E-mail: [sales@neomatica.com](mailto:sales@neomatica.com)  
<http://neomatica.com>*

## Appendix A. Bits description for the «STATUS» field

Table A.1. «STATUS» field bits description

Bits	«Status» field description	Mask value
0	Tracker reboot indicator	1
1	Active SIM card number (0 – SIM0, 1 – SIM1)	2
2	No connection to the server	4
3	Guard mode enabled	8
4	Battery low voltage indicator	16
5	Invalid coordinates indicator (validity)	32
6	Coordinates are frozen during parking	64
7	Tracker external power supply off	128
8	Alarm went OFF	256
9	-	512
10	-	1024
11	Battery high voltage indicator	2048
12	Sign of using microSD card as “black box”	4096
13	Case opening detected	8192
14	Coordinates are defined by GSM base stations	16384
15	Headset button is pressed	32768

## Appendix B. WIALON system parameters description

Table B.1. Description of basic parameters for ADM 700 protocol in the Wialon system

Parameter	Description
acc	Current point acceleration module, km/h/s
sats_glonass	Number of GLONASS satellites involved in fixing a navigation problem
sats_gps	Number of GPS satellites involved in navigation problem
hdop	Precision reduction on a horizontal plane
pwr_ext	External power voltage value, mV
adc1	Analogue input voltage value, A_IN0, mV
adc2	Analogue input voltage value, A_IN1, mV
adc3	Analogue input voltage value, A_IN2, mV
adc4	Analogue input voltage value, A_IN3, mV
adc5	Analogue input voltage value, A_IN4, mV
adc6	Analogue input voltage value, A_IN5, mV
count1	Frequency/flowmeter/D_IN0 input state value
count2	Frequency/flowmeter/D_IN1 input state value
fuel1	Fuel level value in sensor No. 0 connected via RS-485 interface
fuel2	Fuel level value in sensor No. 1 connected via RS-485 interface
fuel3	Fuel level value in sensor No. 2 connected via RS-485 interface
temp1	Temperature value in sensor No. 0 connected via RS-485 interface
temp2	Temperature value in sensor No. 1 connected via RS-485 interface
temp3	Temperature value in sensor No. 2 connected via RS-485 interface
I/O	Summary value of device status and inputs, outputs condition
vib	Current level of vibration
in1	Condition of discrete sensor set for A_IN0 input
in2	Condition of discrete sensor set for A_IN1 input
in3	Condition of discrete sensor set for A_IN2 input
in4	Condition of discrete sensor set for A_IN3 input
in5	Condition of discrete sensor set for A_IN4 input
in6	Condition of discrete sensor set for A_IN5 input
in7	Condition of discrete sensor set for D_IN0 input
in8	Condition of discrete sensor set for D_IN1 input
in9	Tracker reboot indicator
in10	Active SIM card number
in11	No connection to the server
in12	Guard mode enabled
in13	Battery low voltage indicator

<b>Parameter</b>	<b>Description</b>
in14	Invalid coordinates indicator (validity)
in15	Coordinates are frozen during parking
in16	Tracker external power supply off
in17	Alarm went OFF
in18	Cutoff failure of GPS/GLONASS antenna
in19	Short circuit of GPS/GLONASS antenna
in20	High power supply voltage indicator
in21	microSD card used as "black box"
in22	Case opened
in23	Coordinates are defined by GSM base stations
in24	Headset button is pressed
out1	Tracker output OUT0 activated
out2	Tracker output OUT1
out3	Tracker output OUT2
out4	Tracker output OUT3

## Appendix C. CAN-LOG parameters description

Table C.1. Description of parameters transmitted in the Wialon system when connecting CAN-LOG to ADM700 3G

Parameter	Name	Use	Unit of measurement
can0	E_cons	total fuel consumption	liter
can1	H_RPM	Engine rpm	50/min
can2	I_temp	Engine temperature	degree
can3	A_time	Total time of engine operation	0,1 hour
can4	C_distance	Total run	km
can5	G_level	Fuel level	0,1 liter (0,1 %)
can6	S_flag	Status flags	see below
can7	P_alarm	Accident controllers	see below
can8	K_axis	load on axle 1	0,1t
can9	L_axis	load on axle 2	0,1t
can10	M_axis	load on axle 3	0,1t
can11	N_axis	load on axle 4	0,1t
can12	O_axis	load on axle 5	0,1t
can13	WB	harvesting time	0,1 hour
can14	WC	harvested area	0.1Ha
can15	WE	harvested crop volume	0,1t
can16	WF	grain moisture	0,20%
can17	WA	agricultural machines condition	see below
can18	Z	load on engine	%
can19	U_adblue	AdBlue	liter (%)

Table C.2. Description of certain “flags status” parameter bits

Bit No.	Use
1	driver’s door opened
2	passenger’s door opened
3	trunk opened
4	hood opened
5	hand brake *
6	foot brake *
7	engine enabled*
8	webasto
9	ignition is on
10	standard alarm (alarm mode)
11	standard alarm
12	key is in the ignition lock
13	Dynamic ignition
14	
15	
16	

\* information is available when ignition is on

Table C.3. Description of certain «**agricultural machinery status**» parameter bits:

Bit No.	Use
1	harvester
2	grain release from the hopper
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	

Table C.4. Description of certain «accidents controllers» parameter bits

Bit No.	Use
1	
2	
3	
4	
5	
6	
7	passenger's belt
8	driver's belt
9	ESP
10	heating plug
11	FAP
12	EPC
13	marker lamps
14	passing beam
15	Main beam
16	
17	check engine
18	external lighting
19	pressure in cans
20	brake blocks wear
21	warning
22	ABS
23	low fuel level
24	
25	STOP
26	pressure/oil level
27	engine coolant temperature
28	Braking system
29	Battery charge
30	SRS
31	
32	

# Appendix D. ISO 9001:2015

