GLONASS/GPS Tracker
MIELTA M1
(THA-1803-01)

User manual

Firmware version 2.7.0
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1. Description

Tracker MIELTA M1 is focused on simple and economical solutions in the field of monitoring in transport. M1 has compact dimensions, low weight and is equipped with the most necessary interfaces for working with peripheral devices. The terminal is used for collecting, processing, storing and transmitting information on mobile and stationary objects of control. In combination with additional sensors it is possible to monitor fuel consumption, activity of executive devices, vehicle parameters, driver identification and much more. The terminal is adapted for power supply in any automotive on-board network, has built-in antennas for easy installation.

2. Technical characteristics

Power supply	5 – 36 V protection from surges, reverse polarity protection, PTC fuse.
Power consumption	1 W
Battery	No
Universal ports	2 ports Analog input mode: DC 0-36 V, input resistance 30 kOhm, 10 bit ADC; Discrete input mode: active level - 0V, internal pullup 3.3 V, input resistance 20 kOhm, frequency up to 40 kHz, counter up to 1000000; Discrete output mode: open collector, DC current up to 200 mA, self-induction protection.
Accelerometer	Internal, 8G
1-wire	Internal, up to 8 devices
RS485	Internal, up to 8 devices
USB 2.0	Конфигурирование, прошивка, передача данных, питание
Navigation	GLONASS, GPS, -166 dBm, internal patch antenna 25x25 mm
GSM-antenna	Internal, 900/1800 MHz
Bluetooth	Bluetooth 3.0, configuration, firmware update, data transmission
Memory	4 Mb, 10000 points
SIM-card	1 pcs, micro-SIM
Multiserver data transmission	3 server
Protocol	Wialon IPS 1.1, IPS 2.0, binary
Ingress Protection Rating	IP44
Operation temperature	-40 to +85 °C, humidity 98% at a temperature of 25 °C, without dew.
Averall dimensions	49 x 64 x 17 mm
Weight	60 g

3. General information

3.1 Power

Tracker is designed for use in automotive on-board system voltage 12/24V, or from USB adapter 5V 1A. When powered from on-board network has the ability to control the discharge of the on-board battery and if necessary go into power saver mode before the appearance of certain conditions depending on the configuration. Modern circuit solutions enable the Terminal to work consistently in the range of supply voltage from 5 to 36 volts. M1 has built-in protection against overvoltage, as well as pulse jamming.

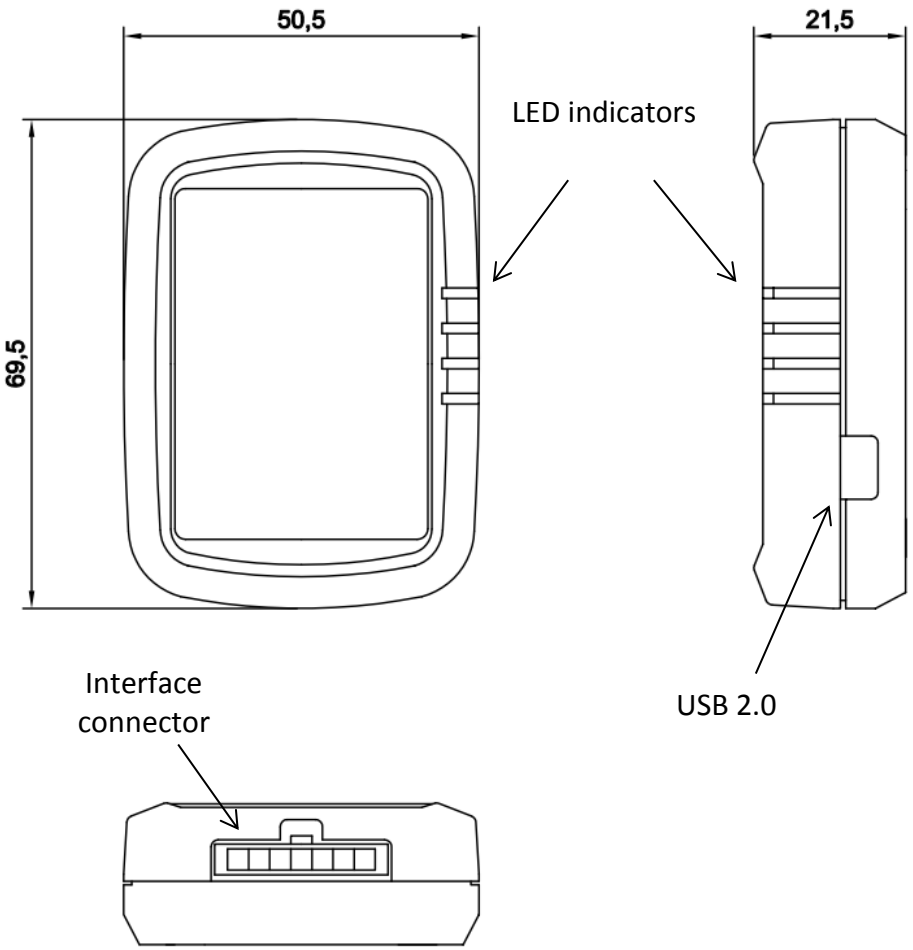
3.2 Configuration

The Tracker has a set of commands to configure settings that control the State and display information (see annex 1). The work can be carried out via the USB port (configurator utility), via SMS, the TCP commands from the server monitoring (GPRS), as well as Bluetooth (using Android-Configurator on the mobile device).

Default access password - 12345. If necessary, you can replace the password. If you lose your password to regain access to the device is possible by contacting technical support MIELTA.

3.3 Communication

The Tracker has a USB connector for connecting to a personal computer and is used to supply, configure and update software. Micro-Fit 3.0 connector is used to connect the main power supply and peripherals. On the reverse side there is a schematic representation of the plug-in contacts (Figure 2). Before placing it in your site, you must install a SIM card. For this purpose it is necessary to unscrew the bottom cover of the Tracker, which is attached with four screws. To protect against unauthorized access, the case is sealed up by a sticker.



Pcture 1. M1 exterior

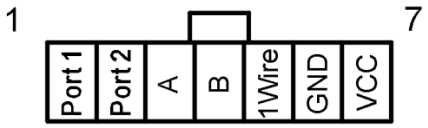


Figure 2. Peripheral Micro-Fit connector

Table 1. Peripheral Micro-Fit connector piouts.

Номер	Обозначение	Description
1	Port1	Universal port 1
2	Port2	Universal port 2
3	A	RS-485 line A
4	B	RS-485 line B
5	1Wire	1-Wire
6	GND	Power ground
7	VCC	Power DC 5 – 36 V

3.4 Indication

On the front panel of the Tracker are 4 LEDs: green, yellow, blue, red (see table 2).

Table 2. Display during normal operation

LED	Function	LED switched on	Blinking slow	Blinking fast	Blinked once
Green	Power on	External power	No External power, powered from USB	Black box clearing	Track point saving
Yellow	GLONASS/ GPS	Coordinates are defined	Unstable GLONASS/ GPS signal	Time is not synchronized	-
Blue	GSM	Registered in mobile network	Problems with regsitration or SIM card	Regsitration in network	-
Red	Server	Connected to Server	Problems connecting to server	Activation of GPRS-session, connection to the server	Sending data to the server

Combination:
- All LEDs are switched on – normal work;
- Green blinking slow, red switched on – disaster recovery mode;
- Green led blinks one time in 10 seconds, other switched off – power saving mode;
- Blue and red LEDs blinked alternately – process of renovation.

In the display sequence:
1. Successful launch:
   - Red (bootloader);
   - turns off red, green (successful launch program);
   - connecting to the GSM and the server.
2. Bad start:
   - Red;
   - reboot.
3. A bad start after you change the main program:
   - red for 30 seconds;
   - rebooting, several times trying to download;
   - try to restore a previous version;
   - normal start of the restored version of the program.
4. Power saving mode:
   - light up quickly the two extreme, then two central – sleep mode.

3.5 Universal ports

Universal ports Tracker can operate independently in the following modes (see table 3).

Table 3. Unversal ports modes

1	Analog input	Voltage measurement, 0 – 36 V
		Ignition signal control
2	Discrete input	Frequency measurement, 1 Hz – 40 kHz
		Low frequency measurement, 0.1 Hz – 40.0 Hz
		Counter, front edge, 0 – 999999
		Counter, back edge, 0 – 999999
		Discrete signal, 0/1
		Encoder (Port1 + Port2), 0 - 999999, increment, decrement
		Alarm button, 0/1, track point saving
3	Discrete output	0/1, i-button key activation

The analog input is designed for voltage measurement and registration of slowly changing signals. Measurement of signal level occurs 20 times per second. The data smoothing algorithm is applied.

When you activate the ignition control function, you can select the signal source is one of universal ports either power network. In this mode, the Tracker monitors voltage and modifies the Boolean value of the "IGN" when passing through the established threshold voltages.

Binary input, designed to work with sensors and signal sources open collector type. High signal level limited voltage 36 V, low level should be no more than 1 V from GND. The Tracker has an internal pullup to + 3.3 v.

In some cases, to improve anti-jamming and ensure a minimum load current of a frequency output of the external appliance, you must be connected pullup resistors with nominal 4.7-10 kOhm between the signal wire and power plus (no more than 36 V).

Tracker has two modes of frequency measurement - high and low, two modes of counting pulses with synchronization on the front and the recession signal, as well as logical status mode entry (entry by the mass closure gives «1»).

Encoder mode uses two ports simultaneously and can keep counting pulses from 0 to 999999 in two directions (increment, decrement). Used, for example, for compensation of oscillating movements of flow sensors.

Digital output is built according to the scheme "open collector" and is intended for control of actuating devices. The following operating modes: manual mode (switch output status on the team) and identification mode (change status to detect the iButton keys/RFID cards out of the allowed range).

Before activating discrete output mode of universal port Tracker, disconnect all external circuits connected to this port.

Before connecting the external circuit, make sure that the current universal port in discrete mode will not exceed the maximum value of 200 mA.

3.6 Digital interfaces

Algorithm of working with digital sensors is built on traditional trackers MIELTA scheme with virtual slots. In Tracker defined slots for each digital interface (eight for RS485 and eight for 1-Wire), each of which can be configured on any sensor supported by tracker. The main advantage of this approach is flexibility, ease of configuration and the ability to simultaneously support various protocols on a single interface. Configuring sensors can be made during operation, do not interrupt the flow of data and does not require restarting. Data can be obtained immediately after the correct sensor settings (using Configurator, all changes can be tracked in real time).

Featured network settings for peripheral devices 1-Wire and RS-485 are given in tables 4 and 5.

Table 4. Featured 1-Wire network settings

Length of the line	The number of devices on the bus	The type of cable used	Topology
Up to 5 m	Up to 8 pcs	Любой	Free
Up to 20 m	Up to 8 pcs	2x22(20) AWG UTP Cat. 3-5e	Bus with patches up to 0,5 m
Up to 50 m	Up to 8 pcs	Only UTP, FTP Cat. 3-5e	Bus only

Table 5. Recommended settings for the RS-485 network

Length of the line	The number of devices on the bus	The type of cable used	Topology
Up to 20 m	Up to 8 pcs	2x22(20) AWG UTP Cat. 3-5e	Bus with patches up to 5 m
Up to 100 m	Up to 8 pcs	Only FTP, STP, S/FTP Cat. 5-7	Bus with patches up to 2 m

With a bus length of more than 20 metres, you must use a terminating resistor 120 Ohm on the opposite end of the line from Tracker.

To ensure correct and safe operation of digital interfaces must combine mass potentials of Tracker and connected devices, or negotiate signal using an optical isolator.

5. Functionality

4.1 Communication

Tracker has combined communication module SIM868. On the PCB is installed micro-SIM card holder with hinged lid, for the installation it is necessary to open the case. Supports hot swapping the SIM card without shutting down the power supply.

Built-in GSM modem works in the ranges 900/1800 Mhz, supports GPRS class B, multi slot 12/10. To activate the GPRS access point settings are as follows:

- access point name;
- login;
- password.

If GPRS-session is active, the Tracker starts the process of connecting to the monitoring server. Simultaneous work with three different servers. To configure the connection, use the following options:

- Server address (possibly set up as an IP address, for example 193.193.165.165, and the DNS name of the server, for example hosting.wialon.com, the maximum length of the name is 63 characters for the main server and 47 characters for two additional servers);
- the connection port, depending on the Protocol (for example, 21204);
- the access password to the server, the maximum length is 15 characters;
- communication protocol (Wialon IPS 1.1, 2.0 and Wialon IPS binary protocol supported).

4.2 Unloading of the track to the server and traffic consumption

After successfully connecting to the servers Tracker starts unloading collected data track from the built-in "black box". The M1's internal memory store up to 10000 records, intended to send to each server and for unloading through the configurator. The number of points to be sent to each server does not depend on the number of configured connections. The order to unload of the messages and "black box" from newest to oldest. Tracker allows you to unload up to 10 points in the package, no more than 1 kilobyte. When you add a new server will be unloaded to 10000 previous entries, so if necessary, clean up the "black box".

The following modes of uploading data:

- **Quick.** This type of unloading is the most uneconomical in terms of traffic, however, allows you to track the object on the server with the minimum of delay. If the connection to the server is active, the track point to the server is unloaded immediately after registering the Tracker.
- **Batch**. This type of discharge is a compromise between the consumption of bandwidth and delay in unloading the current data on the server. This mode is specified by setting the maximum allowable delay unloading data. That is, a package to send to the server is formed or when a maximum delay time of

departure of the previous package, or if the number of records in the black box is greater than the maximum possible number of points in the package. In other words, if the black box is empty, the Tracker is waiting for the timeout to allow sending the next packet, and if the black box records accumulated, then the Tracker sends data packets without delays until it unloads all the records from the black mailbox.

- **According to the schedule**. This mode provides for economical unloading track. To do this, specify the period during which the discharge is the accumulation of data. Accumulation mode data connections with approved servers and GPRS-session inactive. Over time accumulate data Tracker connects to the approved to operate servers and uploads data. After sending all black box data Tracker again terminates connections and accumulates data during the period of discharge. Data accumulation mode remotely Tracker is available only for SMS commands.

Unloading track modes are on a home network and roaming. Here it is worth noting that the more track points will be sent in the package, the lower the overhead of packet headers and less traffic consumption. To send data Tracker uses TCP connections.

When you configure the modes and conditions registration track points should be borne in mind that the Tracker includes support for permanent connection to servers (keep-alive) connection was lost on timeout. If the timeout time (3 minutes) you have an active connection to the server was not sending data packets, then the server is sent to the ping package. This reduces the costs associated with the disconnects and reconnects to the server, but still consumes bandwidth.

4.3 Unloading track points to multiple servers

The Tracker has the ability to work with multiple monitoring servers simultaneously. For each server, you can specify any supported in this version of the Protocol. When configuring the connection sets connection activity indicates an IP or domain name, port and Protocol for transferring data. Password authorization on the server and the mode of unloading points is defined globally for all connections after sending a password to access tracker from one server appears automatically access from other active servers, so if necessary after the completion of the the remote works with the Sun Tracker to send click logout. All posts by user actions are sent simultaneously on all servers that are specified in the settings of the Tracker. The maximum number of entries does not depend on the number of configured connections-entry points is executed simultaneously for all connections and unloading through the configurator. If a server is unavailable, then slowed down unloading points on the available servers.

4.4 Time synchronization

After power Tracker, you must synchronize the system time with the source of accurate time. Tracker allows you to synchronize time in two ways: to seek the exact time

with the base stations of cellular operator or get from GPS/GLONASS satellites. Until the time Tracker is not synchronized, the registration points of the track is prohibited. Sync on base stations immediately after power-up lets you ensure that data with connected sensors, even in the absence of sustained signal reception with GPS/GLONASS satellites. It is worth noting that not all mobile operators support this feature.

Every day when you change the date system time check is received over time from navigation satellites. If vehicle is stationary for a long time with poor signal reception from satellites (garage), then perhaps the clock error accumulation system time on the monitor server in this case will send a message to "WARN: RTC CLOCK".

4.5 Registration of track points

Register Tracker track points being in one of three modes:

- stop;
- parking;
- movement.

After power and time synchronization Tracker allows the registration points of the track and goes into "stop" mode. In this mode there are two settings:

- **Period of registration points.** Sets the time interval between registration points track points.
- **A time of transition in mode of "parking**". Sets the maximum time spent in "pause" mode, after which the Tracker goes “parking”. The main difference between these modes is that parked its associated configuration, you can enable power saving mode, which will be described below.

In the "parking" you can configure the registration period points. When you register the beginning of movement "stop" mode or "parking" becomes "movement". For flexible adjustment of registration points during movement, there are two profile settings for low and high speed. First you need to specify boundary velocity ranges, separating low and high speed. Such partitioning enables you to, for example, to specify different settings for traffic in the city and on the highway. For each profile contains the following settings:

- Distance. Sets the maximum distance relative to the previous registered point track.
- Angle. Sets the maximum change of direction relative to the previous registered point track.
- It's time. Sets the maximum time between registration points track points.

For the "movement" mode is also implemented registration of track points on exceeding the maximum permissible speed. To configure logging points to exceed the stipulated two settings:

- Exceeding the speed limit. Sets the maximum permissible speed of an object, by exceeding which the track point.
- The increment speed in excess of. Sets the interval register track points for speeding.

There is a possibility of formation of track points to exceed the threshold values for the custom acceleration in units of G acting on the Tracker. Thus, there is a possibility of fixing cases sharp acceleration or braking the vehicle. In repose to the Tracker operates free fall acceleration 1 G.

Additionally there is the possibility to adjust the registration point of the track when the status of the ignition.

4.6 Filtering spurious emissions GPS coordinates

In order to prevent the registration of coordinates with low accuracy in Tracker "GPS filter" is implemented. This filter has the following settings::

- Maximum HDOP;
- The minimum number of satellites.

To filter the "false travel" and "stars" on parking included filters and acceleration sensor filter by ignition. Filters can be independently enabled and disabled. If both filters are activated and acceleration sensor registers movement start and ignition while inactive (for example, during the evacuation of the vehicle), the Tracker will register the track. To control the ignition can be used one of universal ports mode, either supply voltage Tracker. For each source there is hysteresis. To filter the "stars" on parking in areas with unstable satellite signal you should disable transmission of coordinates on parking removal appropriate check box in the Configurator or using the console command.

4.7 Power-saving modes

In Tracker implemented three energy mode:

- Main mode. In this mode, the Tracker logs track points and produces data submission in accordance with predefined settings.
- The power saving mode. Mode is designed to conserve battery power on parking, excluding the data loss. That is, registration data from sensors and GPS-receiver does not stop. And turns off to save power GSM-module and is included once per hour to 15 minutes for unloading of the track. If it is prohibited to unload in roaming, GPRS session is not activated, but left in an enabled state module and the Tracker is ready, if necessary, to perform the incoming SMS commands. To enable and disable features you can configure "allow power saving mode on parking." If the mode is enabled, the Tracker navigates to it immediately after switching to "parking".
- Sleep mode. Mode is intended for long-term parking. Sleep mode periodically Tracker keeps track of the value of the supply voltage, the rest of the functionality is unavailable. For cases the power supply of the Tracker directly from the battery of the vehicle and, if the assumed long breaks between journeys, it is recommended that you enable the setting "enable sleep mode on parking" for operation from external power. Here you can set two

thresholds: voltage of “sleep mode" and exit voltage of the mode. That is, here the Tracker also tracks the change in voltage (at the got engine voltage higher than off).

4.8 How to configure settings for Tracker

Tracker configuration is done using the text console commands. To access the Tracker you must enter a password. In cases of loss of password, you can enter the master password. Address in technical support of MIELTA. Master password has a limited validity period.

Several ways to customize the Tracker:

- TCP commands;
- SMS commands;
- Windows configurator utility by USB;
- Android configurator utility by Bluetooth.

Configuring TCP or SMS comes directly sending the text console commands to the Tracker. It is possible to send multiple commands in a single message, with commands written in execution order and are delimited by a semicolon. A full list of commands is given in annex 1.

Working with Mielta Tracker in console mode begin with user authorization *pwd* command. All commands except for pwd and logout last line return *OK* or *ERR*. *OK* indicates that the command completed successfully, *ERR* means that an error occurred while executing the command or command is entered incorrectly. In the Tracker, there are several users, each of which independently authorization is required: 1. Phone (SMS) 1; 2. Phone 2 (SMS); 3. Phone (SMS) 3; 4. Phone (SMS) 4; 5. USB (command line); 6. Bluetooth; 7. TCP (server monitoring). Allowed simultaneous work with multiple Tracker users. A list of phone numbers from which allowed sending commands to the Tracker, you can get phone, allow new phone number-set phone.

After entering the password, Access opens automatically closes after 30 minutes of inactivity or the corresponding command.

Table 6. Tracker sample, configure connection parameters:

Command	**Ansver**
pwd 12345	*Welcome! User logged in*
set apn 1 internet.beeline.ru	*ok*
set loginapn 1 beeline	*ok*
set pwdapn 1 beeline	*ok*
set phone 1 79601234567	*ok*
rebootall	

Table 7. For an example of configuring sensors:

Command	**Ansver**

pwd 12345	*Welcome! User logged in*
set sensor R4.1 LLS Fuel 1 1 3	*ok*
set sensor OW1 DS1820 Temp 1 1 987654321	*ok*
logout	*Good-bye! User logged out*

To work on USB or Bluetooth designed Windows and Android configurator utility. When working through the Configurator also possible sensor tracking and statuses in real time. When working with Android-configurator to start searches for available Bluetooth devices.

Once the desired access point Bluetooth connection PIN code is requested, then the Configurator prompts you to enter a password to access the device. After entering the correct password Configurator has access to Tracker.

Tracker in the Windows operating system is defined as a virtual COM port. By clicking the "device selection" in the Configurator runs the search window, where you can view all devices found trackers. After selecting one of them and enter a password to access the connection occurs. To work with Windows-Configurator Additionally implements the following functions:

- firmware update Tracker from a file;
- unloading of the track records of the black box in a file, it is possible to unload already sent points;
- import/export of all settings in the file Tracker.

4.9 Bluetooth access point

To configure the access point provides the following options for:

- **PIN**. You need to initialize the connection via Bluetooth.
- **The name of the access point**. Is set to identify the Tracker when you search for available Bluetooth devices. By default, the name is defined as a numerical value device IMEI.

Implemented multiple modes of operation:

- **Disabled**. Bluetooth access point is unavailable.
- **Enabled until you restart**. Activates the access point until you restart Tracker.
- **When power is turned on**. The access point is activated every time when you disconnect and external supply voltage (even if you are reconnecting Tracker continues to work from the built-in battery). Access point after reconnecting the power active 15 minutes, and if during that time was not Bluetooth connection after this time is disabled.
- **Always on**. Bluetooth access point always available.
- **Speakerphone.** Bluetooth is used to connect to the headset for voice communication (see section 4.10).

Bluetooth access points work on the Tracker practically does not affect the unloading track and the rest of the functional GSM-module that allows you to connect your Android device and use it as a monitor sensors in real time.

4.10 Work with a Bluetooth headset

To receive voice calls, you can connect a wireless headset. To do this, in the “Communication” menu of the configurator program in the “Bluetooth Settings” block, select the appropriate mode and click the “Write settings”. To pair with a wireless headset, click the Configure button, search for available devices, and select the desired device. After clicking the “Write settings” button, the MAC-address of the selected device will be stored in the terminal memory. The terminal will automatically connect to the selected device, if available. An incoming call is answered automatically. If the headset is not used, hands-free mode should be turned off.

4.11 Digital sensors

On each of the available interfaces (RS-485, 1-Wire) there are eight slots and can be connected up to 8 digital sensors.

To work with the sensor, you must choose the corresponding slot of the interface, choose sensor type, specify the required settings (bus address, data type, etc.). One sensor can be selected within the slots. For example, the fuel level sensor produces 3 parameter (fuel level, frequency and temperature) by adjusting the three slots on the fuel level sensor for each data type, we get all three measurement parameters and send them to the server monitoring.

A packet of data sent to the server is created automatically, depending on the availability of active slots. On the server slots are denoted as follows: R 4.1, ..., R 4.8 for RS-485 and OW. 1, ..., OW. 8 for 1-Wire. For example, the first slot RS-485 and 5-th slot 1-Wire bus on the server is as follows: R 4.1 = 4096, OW. 5 = 123456. For some types of sensors available possibility to receive 2 parameter with a single slot, in this case, the slots on the server will have the following designations: R R 4.1.1, 4.1.2, ... R 4.8.1, R 4.8.2.

4.12 Work with the system display Mielta

The Tracker System supports display MIELTA RS-485 bus. The system display is used to display the overall status Tracker, connection parameters, data from different interfaces, specially adapted for work on stationary and mobile gas stations. Tracker supports up to 8 displays on bus system, each of which can display different data. The display is connected to one of the RS-485 port slots with the address, similar the sensors.

4.13 Working with FLS Autosensor

When working with FLS Autosensor besides the usual parameters (temperature, level, frequency) the terminal allows you to request data about the quality of driving. The list of available parameters is given in the FLS instruction. To work with FLS Autosensor at each of the terminal slots, it is possible to request one parameter (TEMP / PARAM1) or two parameters (PARAM2). If the request type is PARAM1, then the terminal forms a request in accordance with the selected address configured on the slot. If the type is PARAM2, the slot settings indicate the address of the first parameter that must be requested in the FLS. Address of the next parameter is generated automatically by incrementing the address of the first parameter. In this case, two values are sent to the slot (for example, R4.1.1 and R4.1.2).

4.14 Working with ZET7012 pressure sensor

To work with the sensor, it must be pre-configured using the appropriate program (ZETLab). To work with the terminal, set the exchange rate to 19200 bps, then connect the sensor to the terminal. In the settings of the RS485 slot specify the type of sensor and address. The measurement result is displayed with an accuracy of three decimal places. This result must match the value on the “Measurements” tab of the ZETLab program.

4.15 Driver identification

In the Tracker the driver identification function on RFID cards or iButton keys. For this must be configured at least one slot type sensor «IBUTTONS». Configuring identification is made by set iomode. In the command sets the range of values allowed for identifiers. If the attached key allowed, there is a change of State of a discrete output.

4.16 Manual control of discrete output

To manually control the State of a discrete output provides command

set iomode <ionum> <mode>, where the *mode* parameter can have a value:

dout_on - digital output: output open

dout_off - digital output: output is closed

4.17 Discrete input

For the "digital input" universal ports there are five submode:

- Frequency meter with an accuracy of 1 Hz for band 1-40000 Hz.
- Frequency meter with an accuracy of 0.1 Hz range 0.1-40.0 Hz.
- Counter. For this mode, in addition, reset the value.
- Encoder. Is intended for rotation sensors
- State. In this mode, a monitoring server is sent to the binary status (0 or 1).

4.18 Alarm button

To indicate an emergency alarm button function events. Each universal port can be used to connect the alarm button. When a button is generated extraordinary record in the black box. Optionally, you can configure the generation of text message to send to the server monitoring.

4.19 Odometer

The terminal software has an algorithm for calculating traveled distance based on the received navigation data. The calculation does not depend on the registration of track points. The traveled distance is stored in the terminal's memory with an accuracy of 1 meter, but it should be borne in mind that the accuracy of distance measurement depends on the accuracy of determining the coordinates, i.e. ultimately it depends on the HDOP parameter and the satellite signal quality. In good conditions, the error does not exceed 1%. The error may increase if the track consists of many turns (excavator, loader). You can send to the statistics server the absolute value of the traveled distance or relative. When sending a relative value, the traveled distance since the previous registered track point is saved at each track point. Absolute value is sent in kilometers, relative - in meters.

4.20 Diagnostics

The terminal has several diagnostics commands that can identify some equipment malfunctions, such as problems with GPS/GLONASS reception or loss of communication with the sensor. A complete list of diagnostic commands is given in the table "Diagnostic commands" of Appendix 1.

5 Software update

There are several ways to update Tracker:

1. Update via USB through the Configurator utility.
2. Remote Update: Tracker should send the command "serupdate N" in any way possible (TCP or SMS from the Configurator). N is the version number of the firmware on the server. During remote Tracker updates continues to work in normal mode. Firmware update status can be queried from the website server monitoring from Configurator or via SMS (see the description of the command "*get statusupdatefw*").

In case of damage the firmware Tracker and if you cannot upgrade to the regular way, disaster recovery mode. To restore, you must close the jumper the two special contact on board Tracker (see Figure 4), connect the PC USB cable (USB port on the computer must provide the power), run on your computer utility. This utility writes in Tracker base version

of the software which is able to restore the basic functions of Tracker to install the current version on the regular way.

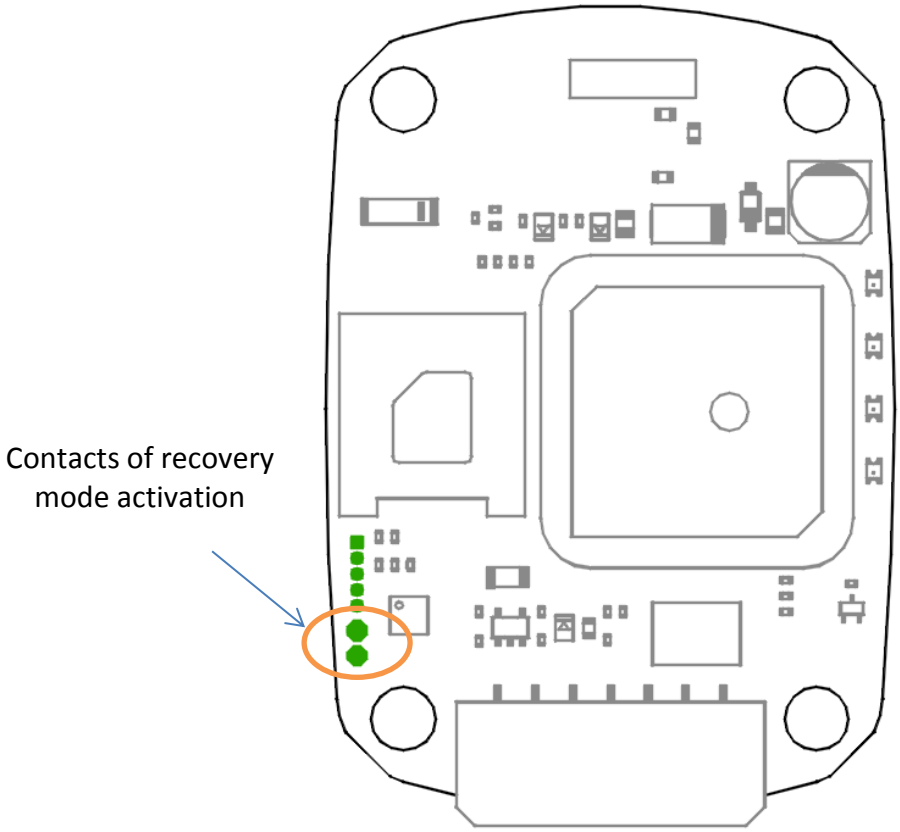


Figure 3. M1 Board

After the firmware update is completed, the tracker is restarted, then the current tracker settings are converted, and in the case of an incompatible format of the old and new version of the QW recordings, the QW is cleared. If the new firmware version has new settings, then their value is set to the default values. Implemented the algorithm for converting settings after upgrading the firmware to an earlier version.

6 Installation

1. Installation of the M1 tracker on the vehicle can be done in several ways:
2. 1. Hidden installation. The tracker should be placed horizontally with the logo up. It is allowed to install under plastic, wooden or glass elements of the body and interior of the car. The power of the tracker should be carried out through the interface connector from the vehicle's on-board network.
3. 2. Open installation. The tracker is mounted inside the car interior, horizontally, with the logo upwards, on the dashboard, or at an angle of up to 90 degrees on the windshield, with the logo ahead in the direction of travel (Figure 4). The power of the tracker can be either from an on-board 12/24 V network or via a USB port from a special adapter, with a USB output of 5V, 1A.

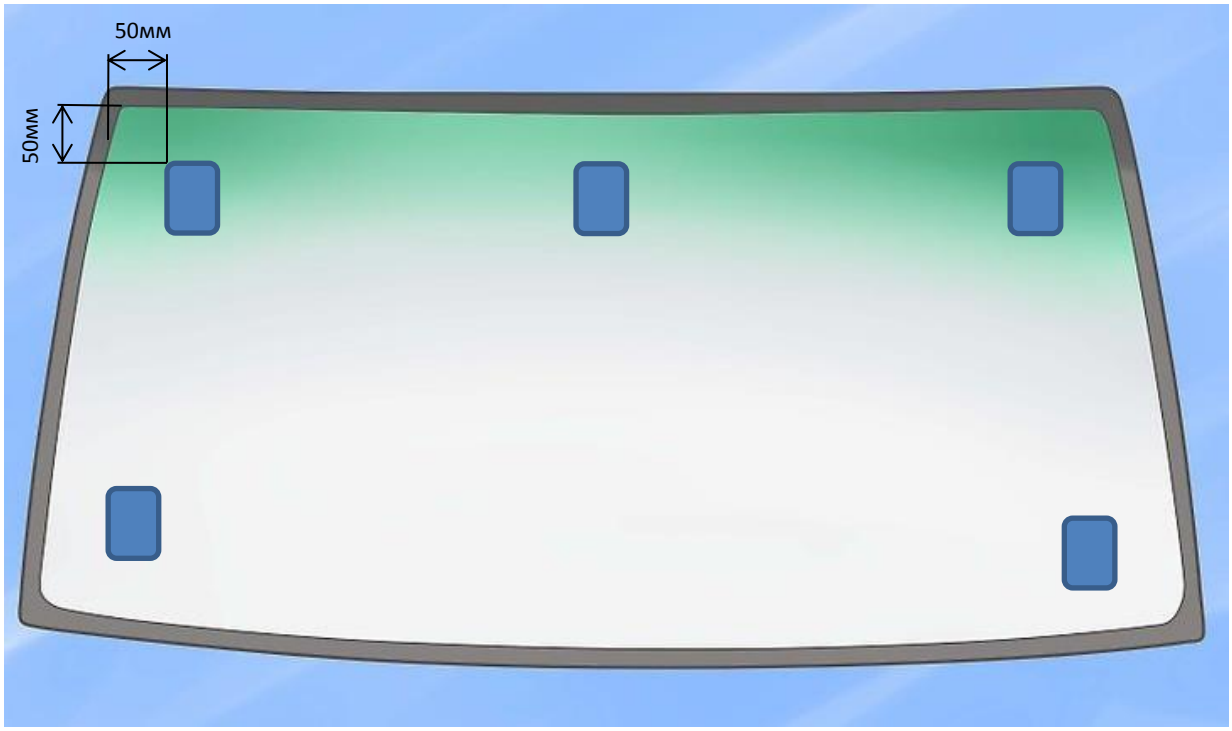


Figure 4. Variants of mounting to the windshield.

⚠ **The installation location should be selected in such a way that the upper hemisphere above the Tracker does not cover metal elements more than 50%, and any metal objects and surfaces were not closer than 50 mm.**

Tracker mount can be produced using plastic clamps or adhesive tape bilateral. Wires and cables connected to the vehicle, must be fixed by any means to avoid damaging the connectors and wire insulation from vibration and deformation.

Annex 1

General purpose commands

1. Enter the password for authentication (*pwd*)

Command format:
pwd <password>

Description:
<password> – a valid password
Example:
Request: pwd 12345
Answer: Welcome! User logged in

2. Change password (*changepwd*)

Command format:
changepwd <old_pwd> <new_pwd> <new_pwd>

Description:
<old_pwd> - old password, *<new_pwd>* - new password

Example:
Request: changepwd 12345 654321 654321
Answer: New password accepted OK

3. Ending a session (logout)

Command format:
logout

Description:
After entering the command further work with the Tracker is only possible after entering the command *pwd*. If the user has no activity for 30 minutes a session ends automatically.
Example:
Request: logout
Answer: Good-bye! User logged out

4. Firmware version (version)

Command format:
version

Description:

Gets the version of the firmware and the date of the Assembly at the end of the line model Tracker (M1, M3 etc).

Example:
Request: version
Answer: ver. 2.6.1.024 30.05.2018 M1 OK

5. Restart Tracker (rebootall)

Command format:
rebootall

Description:
After you run this command, the Tracker then restarts, Ansver "OK" is not guaranteed when sending commands via SMS, Bluetooth or TCP.
Example:
Request: *rebootall*
Answer: OK

6. Module reboot/reset parameter (reset)

Command format:
reset <module/parameter>

Description:
<module/parameter> - module to be reboot /reset parameter
gsm – GSM module;
gps – Navigation module;
cnt1 – Pulse counter FIN1;
cnt2 – Pulse counter FIN2;
odometer – odometer value.

Example:
Request: reset gsm
Answer: Restart GSM module OK

7. Hibernate (gosleep)

Command format:
gosleep

Description:
Sleep mode is used only for long-term storage of the appliance switched off, while Ansver "OK" is not guaranteed when sending commands via SMS, Bluetooth or TCP.

Example:
Request: gosleep
Answer: OK

8. Enable/disable echo mode (echo)

Command format:
echo <on/off>

Description:
This command can be executed only on the command line of Tracker and is not relevant for SMS and for TCP.

Example:
Request: *echo on*
Answer: OK

9. Firmware update (serupdate)

Command format:
serupdate <n>

Description:
<n> - the version number of the firmware for the update server.
If during an update on was not restarted the Tracker, then after some time on the monitoring server will be sent to one of the following messages:
"UPDERR: Update canceled" – update was canceled by a command *serupdate stop;*
"Firmware update successful" – successful completion of software updates;
"UPDERR: Memory write" – Error writing new versions of software, restart Tracker;
"UPDERR: Update cancelled by configurator" – software update is done via the Configurator;
"UPDERR: Update start error" – the required number of firmware on the server not found;
"UPDERR: Pure connection" – exhausted limit connection attempts to the server, you need to clarify the correct IP settings and port number for communication with the update server.
See commands *get/set statusupdatefw, get/set updserverip, get/set updserverport.*

Example:
Request: serupdate 320
Answer: Start update OK

10. Load factory settings (default)

Command format:
default

Description:
After the execution of commands restarts Tracker.

Example:
Request: *default*
Answer: OK

11. Request slot data (slotdata)

Command format:
slotdata <SLOT>

Description:
<SLOT> - slot name *(see set sensor)*
The command returns a string with the following format:
<DATA><OUTDATA>
<DATA> - type of output on a gauge
<OUTDATA> - measured value

Example:
Request: *slotdata r4.2*
Answer: FUEL 0 OK

12. Scanning connected on 1-Wire sensors (scanwire)

Command format:
scanwire <SLOT>

Description:
The command returns a list of the 8-byte identifiers of devices connected on the 1-Wire. If there are no connected devices, then the command returns NA

Example:
Request: *scanwire*
Answer: NA OK

Commands set/get

1. User name change (set/get loginapn)

Command format:
set loginapn <sim> <new_login>
get loginapn <sim>

Description:
<sim> - SIM card number, for Mielta M1 always “1”
<new_login> - username

Example:

Request: *set loginapn 1 mts;get loginapn 1*
Answer: OK MTS OK

2. **Configuring a user's password (set/get pwdapn)**

Command format:
set pwdapn <sim><new_pwd>
get pwdapn <sim>
Description:
<sim> - SIM card number, for Mielta M1 always “1”
<new_pwd> - user password

Example:
Request: *set pwdapn 1 mts;get pwdapn 1*
Answer: OK MTS OK

3. **Access point configuration (set/get apn)**

Command format:
set apn <sim> <new_addr>
get apn <sim>
Description:
<sim> - SIM card number, for Mielta M1 always “1”
<new_addr> - access point

Example:
Request: *set apn 1 internet.mts.ru;get apn 1*
Answer: OK INTERNET.MTS.RU OK

4. **Geting IMEI GSM module (get imei)**

Command format:
get imei

Description:
Applies only with *“get”.*

Example:
Request: *get imei*
Answer: 868345032128613 OK

5. **Configure the PIN code of the SIM card (set/get pin)**

Command format:
set pin <sim> <new_pin>

get pin <sim>
Description:
<sim> - SIM card number, for Mielta M1 always “1”
<new_pin> - PIN

Example:
Request: *set pin 1 1234;get pin 1*
Answer: OK 1234 OK

6. Getting data with acceleration sensor (get accel)

Command format:
get accel

Description:
Applies only with *“get”*.
Returns three values in a range [-4095..4095] on three axes - X, Y, Z, is the value of [-8G..+8G], the fourth parameter is the result value of G with steps of 0.01, the fifth parameter is a filter State, associated with acceleration sensor:
“INIT” – the filter is not activated;
“TRAVEL” – car moving
“STOP” – the car is not moving;
“DISTURBANCE” – car leans.

Example:
Request: *get accel*
Answer: 44 -66 -496 0.98 STOP OK

7. Getting values of voltage Tracker (get syspwrdata)

Command format:
get syspwrdata

Description:
Applies only with *“get”*.
Returns the external power voltage and USB connector voltage in volts.

Example:
Request: *get syspwrdata*
Answer: 13.568 5.063 OK

8. Getting navigation data (get satsdata)

Command format:
get satsdata

Description:
Applies only with *"get"*.
This command returns the current navigation data

Example:
Request: *get satsdata*
Answer: 06:52:38 27.03.18 LAT 52.760361 N LON 41.312553 E SPEED 73 ANGLE 227 HEIGHT 161 SATS 10 HDOP 0.9 OK

9. Getting the number of unsent data in the black box (get bboxdata)

Command format:
get bboxdata

Description:
Applies only with *"get"*.
The response contains 5 numbers. The first three-number of unsent points for each TCP connection, 4th-total amount of sent and unsent records in BB for unloading through the Configurator if necessary, fifth-the number of points with the sync time.

Example:
Request: *get bboxdata*
Answer: 20 0 0 0 104 OK

10. Configure monitoring server access password (set/get pwdserver)

Command format:
set pwdserver <pwd>
get pwdserver

Description:
<pwd> - the access password to the server.

Example:
Request: *set pwdserver newpassword;get pwdserver*
Answer: OK NEWPASSWORD OK

11. Configuring the connection to the server (set/get server)

Command format:
set server <NC> <EN> [<DOMAIN> [<PORT> [<PROT>]]]
get server <NC>

Description:
<NC> - number of TCP connections (0..2);

<EN> - connection status (on/off/reset);
on – work with the server allowed;
off – work with the server banned, but settings are saved;
reset – resetting the connection to the server (used only with the command *set*)
<DOMAIN> - IP or domain name server. For connection 0 the maximum length of 63 characters, 1 and 2 - 47 characters;
<PORT> - the port number*;*
<PROTOCOL> - the protocol used to transfer data.
Параметры *<DOMAIN> <PORT> <PROT>* are not mandatory. If these were specified previously, to change the status of a connection without changing your settings is enough to send a command in the format ser*ver <NC> <EN>.*
<PROT> for server 0 ... 2 can take the following values: IPS_1_1, IPS_2_0 or BINARY.
If you try to deny the connection to a primary server in the message error comes Ansver.

Example:
Request: *set server 1 on google.ru 12345 IPS_2_0;get server 1*
Answer: OK ON GOOGLE.RU 12345 IPS_2_0 OK

12. Configure the list of allowed numbers (set/get phone)

Command format:
set phone <n> <phone>
get phone

Description:
<n> - number of entries in the phone book (1...4), *phone* - phone number (If the phone number "-" character, then record n phone number is reset and becomes grayed out). *"get phone"* gets all phone book entries, telephone number is written in the format 79051211671. The length of the number from 4 to 15 digits.

Example:
Request: *set phone 1 79151234567;set phone 2 79150000000;get phone*
Answer: OK OK 79151234567 79150000000 79004998729 79050850572 OK

13. Configuring slots (set/get sensor)

Command format:
set sensor <SLOT> <TYPE> <DATA> <TPOINT> <PERIOD> <NET> (для слотов RS485)
set sensor <SLOT> <TYPE> <DATA> <TPOINT> <PERIOD> <IDLOW> <IDHIGH> <THOLD> (для слотов 1-Wire)
set sensor <SLOT> <na or *n/a>* - release slot
get sensor <SLOT> - request a slot configuration

Description:
<SLOT> - slot number for ports RS-485 (*R4.1, R4.2, … , R4.8*) or (*OW.1, OW.2, ... , OW.8*) for 1-Wire.
<TYPE> - sensor type
<DATA> - data type supported
<TPOINT> - flag sending the measured data to the server (1 - data sent, 0 - data is not sent);

<PERIOD> - sensor poll period, seconds;
<NET> - sensor network address (for the RS-485 address range 1 .. 255, for RS-232 address is always 255)
<IDLOW> - the lower value of the range of allowed addresses devices 1-Wire, (0..4294967295)
<IDHIGH> - the upper value in the range of allowed addresses devices 1-Wire, (0..4294967295).
If you want to select one device with a known address, the *<IDLOW>* must be equal to *<IDHIGH>*
"get" returns the settings for the selected slot. For ports RS-232 and RS-485 list returned the following settings:
<TYPE><DATA><TPOINT><PERIOD><NET>.
1-Wire port list returned the following settings:
<TYPE> <DATA> <TPOINT> <PERIOD> <IDLOW> <IDHIGH> <THOLD>.

Example:
Request: *set sensor r4.1 DUTOMNI status 1 1 255;get sensor r4.1*
Answer: OK DUTOMNI STATUS 1 1 255 OK

14. Configure the list of additional parameters to be sent to the server with a registered track point (set/get wlndata)

Command format:
set wlndata {<FLAG1>}..{<FLAGn>}
get wlndata

Description:
Data set is determined by the flags listed with a space after the command. Possible names of flags *<FLAG1>...<FLAGn>: gprs, io1, io2, gprs, accl, igns, odom*
ain1 – send to the server the value of voltage at analogue input;
gprs – sending connecting state data
io1, io2 – sending values universal ports
accl – to send a value acceleration in units of G with discreteness 0,01 G, while reliability is guaranteed for values up to 8 g.
Igns – sending the ignition status
odom – to send a value of odometer
The "get" command returns a list sent to the monitoring server additional options in the package with the registered point of the track. If nothing is sent, NONE is returned.

Example:
Request: *set wlndata io1 odom gprs accl;get wlndata*
Answer: OK GPRS IO1 ACCL ODOM OK

15. Registration status in the network and connection status monitoring servers (get gsmstatus)

Command format:
get gsmstatus

Description:
Applies only with *"get"*.
The command returns a string: *<NSIM> <DET> <RSSI> <OPER> <GPRS> <SRV0> <SRV1> <SRV2> <SRV3>*

Где *<NSIM>* - the selected SIM card slot.
<DET> - the availability status of the SIM card in the selected slot. The possible values: *DETECT*, *NDETECT*
<RSSI> - Signal level GSM network (*0..31).*
<OPER> - Code for the operator
<REG> - Registration status in the GSM network.
The possible values for the:
NO_SEARCH - not registered in the network, not looking for a network;
REG_HOME – registered in the home network;
SEARCH – not registered, search network;
DENIED - registration is prohibited;
UNKNOWN – status is not defined (usually when there is no SIM card);
REG_ROAMING – registered in roaming;
<GPRS> - status GPRS (*GPRS_Y, GPRS_N – GPRS* on or off)
<SRV0>..<SRV3> - connection status monitoring servers and server updates.
The possible values:
AUTH – authorization is executed on the server;
CONNECTED – Tracker logged on the server;
REJECTED – the server rejected request for authorization,
PASSWORD_ERR – wrong password authorization on the server;
NO_CONNECT – no TCP connection to the server.

Example:
Request: *get gsmstatus*
Answer: SIM1 DETECT 18 25001 REG_HOME GPRS_Y AUTH NO_CONNECT NO_CONNECT NO_CONNECT OK

16. The status of the remote firmware update (get statusupdatefw)

Command format:
get statusupdatefw

Description:
Applies only with *"get"*.
The command returns the following information about the update process: UPDATE *STATUS*, firmware number (*VER*), number of received bytes (*DOWNLOAD*), the number of attempted connections to the server for updates (*RESTCONNECTS*). *If the device is not updated, the command returns UPDATESTATUS: FIRMWARE IS NOT UPDATED OK*.

Example:
Request: *get statusupdatefw*
Answer: UPDATE STATUS: UPDATE FIRMWARE VER: 320 DOWNLOAD: 256 BYTES RESTCONNECTS: 99 OK

17. Configuring Bluetooth (get/set btooth)

Command format:
set btooth <pwr_mode> - setting the mode of operation
set btooth name <name> - installing the device name
set btooth pin <pin> - setting the PIN code to connect to the device

get btooth cfg – gets the current settings of Bluetooth
get btooth state – gets the current status of Bluetooth
get btooth mac – gets the headset MAC address
get btooth scan – scanning visible devices

Description:
Team current Bluetooth settings returns a string:
<*name*> <*pin*> <*pwr_mode*>
<*name*> - the device name appears in the list of found devices in the scan. By default coincides with IMEI Tracker, the maximum length of the – 15 characters.
<*pin*> - pin to establish a connection with the Sun Tracker, by default – 0000, possible values must be within the range [0000..9999].
<*pwr_mode*> - Bluetooth operation mode:
"*on*" – always on;
"*off*" – always off;
"*onrst*" – enabled until you restart Tracker.
"*ontmout*" – Bluetooth switched on for 15 minutes after submission of external power
"*speaker*" – Bluetooth is used to connect a wireless voice headset, and a MAC address must be set.
The team get the current state of the Bluetooth returns two numbers:
<*status*> <*connect*>
status – a number from 0 to 25, indicating the current state of the Bluetooth module.
Special cases:
"0" – the module is not initialized
"5" – ready
connect – the presence of active connections currently.
"0" – There is no active connection
"1" – There is an active connection.

The 'get btooth scan' request returns an ERR or OK response. In the first case, you need to make sure that the 'Speaker' mode is configured, then you should send the command to start scanning before receiving an OK response. After this response, the scanning process will begin again. An ERR response may be returned if the Bluetooth module is already searching for devices. To clarify the status of the module you can use the 'get btooth' state command. Immediately after receiving the '5 0 OK' response, the 'get btooth scan' command should be sent within one second.

After you configure the Bluetooth settings, we recommend that you perform the command "*get btooth cfg*" to check whether your customizations.

Example 1:
Request: *set btooth pin 1234;set btooth name mielta;set btooth onrst;get btooth cfg;get btooth state*
Answer: OK OK OK MIELTA 1234 ONRST OK 5 0 OK

Example 2:
Request: *get btooth scan*
Answer: OK
+BTSCAN: 0,1,"Redmi",38:a4:ed:f1:12:3e,-71<0D>
+BTSCAN: 0,2,"Alcatel PX",dc:f0:90:28:0a:a6,-88<0D>
+BTSCAN: 0,3,"Redmi 4x",00:ec:0a:71:01:77,-88<0D>
+BTSCAN: 1<0D>

18. Coordinate filter (set/get aclfilter)

Command format:
set aclfilter <IS_ENABLED>
get aclfilter

Description:
<IS_ENABLED> - Activation the filter from ignition signal.
The possible values: *ON OFF*.

Example:
Request: *set aclfilter on;get aclfilter*
Answer: OK ON OK

19. Satellites (get statsats)

Command format:
get statsats

Description:
Applies only with *"get"*.
Returns a HEX string size of 40 bytes to fill monitoring chart visible satellites. The chart must consist of 20 elements, information about each item in the chart is contained in two bytes: the first two bytes contain the information for the first item in the chart, the second two bytes for the second, and so on.
Answer structure:
<N_SAT INF_SAT><N_SAT INF_SAT>….<N_SAT INF_SAT>
N_SAT – number of satellites (1 byte)
INF_SAT – information about the satellite (1 byte)
Byte structure INF_SAT:
The seventh bit
1 – the satellite is used in calculating the coordinates
0 – the satellite is not used in the calculation of coordinates
6..0 bits - this satellite signal level (0..99)

Example:
Request: *get statsats*
Ansver:
09941E924C9B2B0053001C004B9252174111080E5400078F4A911097429C02991B00059048001700 OK

20. Setting the speed range limit (set/get speedbound)

Command format:
set speedbound <NET> <BOUND>
get speedbound <NET>

Description:

<NET> - network status:
HOME – settings for the home networking zone,
ROAMING – settings for roaming zone.
<BOUND> - boundary value for lower/upper speed range

Example:
Request: *set speedbound roaming 180;set speedbound home 30;get speedbound roaming;get speedbound home*
Answer: OK OK 180 OK 30 OK

21. Configuring log settings track points (set/get trackcfg)

Command format:
set trackcfg <NET> <IS_TIME> {<TIME>} <IS_DIST> {<DIST>} <IS_ANGLE> {<ANGLE>} {<RANGE>} <IS_IGN>
get trackcfg <NET>

Description:
Параметры:
<NET> - network status:
HOME – settings for the home networking zone,
ROAMING – settings for roaming zone.
<IS_TIME> - permission of track point registration by time.
The possible values:
ON – registration by time is permitted;
OFF – registration by time is prohibited.
{*<TIME>*} – If *IS_TIME = ON*, the registration period is specified by the track points while the vehicle is in motion. Point in time is logged when for a given period there were no other events. If *IS_TIME = OFF*, the period is not specified.
<IS_DIST> - permission of track point registration by distance.
The possible values:
ON – registration by distance is permitted;
OFF – registration by distance is prohibited.
{*<DIST>*} – If *IS_DIST = ON*, then set the distance at which the track points recorded during motion. If *IS_DIST = OFF*, the distance is not set.
<IS_ANGLE> - permission of track point registration by angle.
The possible values:
ON – registration by angle is permitted;
OFF – registration by angle is permitted.
{*<ANGLE>*} – If *IS_ ANGLE = ON*, that specifies the rotation angle, at which point recorded tracks while the vehicle is in motion. If *IS_ANGLE = OFF*, the rotation angle is not specified.
{*<RANGE>*} – Selectable speed range, subject to specified in the command settings. The possible values: *LO* – the lower range, *HI* – upper range. If this parameter is not specified, then the settings apply to both the range.
<IS_IGN> - permission of track point registration by ignition signal:
ON – registration is permitted, OFF – prohibited.

get trackcfg <NET>
Answer:

<IS_TIME1>{<TIME1>}<IS_DIST1>{<DIST1>}<IS_ANGLE1>{<ANGLE1>}<IS_TIME2>{<TIME2>}
<IS_DIST2>{<DIST2>}<IS_ANGLE2>{<ANGLE2>} <IS_IGN>
Example:
Request: *set trackcfg home on 120 on 60 on 8 lo on;get trackcfg home*
Answer: OK ON 120 ON 60 ON 8 ON 120 ON 200 ON 5 ON OK

22. Overspeed registration settings (set/get overspeed)

Command format:
set overspeed <NET> <IS_ENABLED> <OVERSPEED><SPEED_INCREMENT>
get overspeed <NET>

Description:
<NET> - network status:
HOME – settings for the home networking zone,
ROAMING – settings for roaming zone.

<IS_ENABLED> - permission of track point registration by overspeed.
The possible values: *ON OFF*
<OVERSPEED> - Speed value, above which begin to register on speeding track points.
<SPEED_INCREMENT> - The increment of speed at which the recorded track points when you exceed. That is, the point of the track is saved when Speed = OVERSPEED + n* SPEED_INCREMENT.

Example:
Request: *set overspeed home on 100 5;set overspeed roaming off;get overspeed home;get overspeed roaming*
Answer: OK OK ON 100 5 OK OFF 110 10 OK

23. Additional data settings (set/get traffic)

Command format:
set traffic <IS_PARKING_COORD> <IS_FIRST_MSG><IS_AUX_ENABLED>
get traffic

Description:
<IS_PARKING_COORD> - Send coordinates to parking mode. The possible values: *ON OFF*.
<IS_FIRST_MSG> - Send a welcome message to Tracker. The possible values: *ON OFF*.
<IS_AUX_ENABLED> - Send AUX fields. The possible values: *ON OFF*.

Example:
Request: *set traffic on off on;get traffic*
Answer: OK ON OFF ON OK

24. "Stop" mode setting (set/get stopcfg)

Command format:
set stopcfg <NET> <PERIOD> <TIMEOUT>

get stopcfg <NET>

Description:
<NET> - network status:
HOME – settings for the home networking zone,
ROAMING – settings for roaming zone.
<PERIOD> - period of registration points in stop mode (s)
<TIMEOUT> - time (min.), since the vehicle stops, after which Tracker stop mode (in which the energy saving mode is enabled).

Example:
Request: *set stopcfg home 10 3;get stopcfg home*
Answer: OK 10 3 OK

25. "Parking" mode settings (set/get parkingcfg)

Command format:
set parkingcfg <NET><PERIOD>
get parkingcfg <NET>

Description:
<NET> - network status:
HOME – settings for the home networking zone,
ROAMING – settings for roaming zone.
<PERIOD> - period of registration points in parking mode.

Example:
Request: *set parkingcfg home 60;get parkingcfg home*
Answer: OK 60 OK

26. Coordinates filter setting (set/get gpsfilter)

Command format:
set gpsfilter <MAX_HDOP> <MIN_SATS>
get gpsfilter

Description:
<MAX_HDOP> - The maximum value of HDOP, above which the coordinates are not valid.
<MIN_SATS> - The minimum number of satellites, for which the defined coordinates are considered valid.

Example:
Request: *set gpsfilter 3.5 5;get gpsfilter*
Answer: OK 3.5 5 OK

27. Configure the ignition signal

(set/get igncfg)

Command format:
set igncfg <IS_ENABLED> {<LOW_VOLTAGE>} {<HIGH_VOLTAGE>}
get igncfg

Description:
<*IS_ENABLED*> - permission of coordinates filter by ignition signal. The possible values: *ON OFF*.
{<*LOW_VOLTAGE*>} - the lower bound of the hysteresis for enabling/disabling the ignition
{<*HIGH_VOLTAGE*>} - the upper bound of the hysteresis for enabling/disabling the ignition.
The ADC channel, which is used to control the ignition, is automatically selected, depending on the operating modes of the universal ports. To use one of the universal ports for ignition control, enable the corresponding mode for this port (see set iomode). If none of the universal ports is operating in the ignition control mode, then the terminal uses the voltage of the external power source to control the ignition.

Example:
Request: *set igncfg on 10.5 12;get igncfg*
Answer: OK ON IO2 10.5 12.0 OK

28. Setting the mode of uploading tracks (set/get uploadcfg)

Command format:
set uploadcfg <NET> <MODE> {<TIME>}
get uploadcfg <NET>

Description:
<*NETWORK*> - Network selection for which settings.
The possible values: *HOME, ROAMING*
<*MODE*> - Uploading mode.
The possible values:
FAST - The point of the track is uploaded immediately after registration;
PACKET - Several points are generated in the packet before being sent to the server;
SCHEDULE - periodic uploading track on schedule.
{<*TIME*>} – FAST mode is not used, for PACKET mode-maximum permissible delay sending track points (s), SCHEDULE mode - GPRS-session activation period and uploading track (m).

Example:
Request: *set uploadcfg home fast;get uploadcfg home*
Answer: OK FAST OK

29. Energy saving mode activation on parking (set/get nrgsave)

Command format:
set nrgsave <IS_ENABLED>
get *nrgsave*
Description:
<IS_ENABLED> - The possible values: ON OFF.

Example:
Request: *set nrgsave on;get nrgsave*
Answer: OK ON OK

30. Sleep mode activation by accu voltage (set/get extaccsleep)

Command format:
set extaccsleep <IS_ENABLED> {<GOSLEEP_VOLT>} {<WAKEUP_VOLT>}
get extaccsleep

Description:
<IS_ENABLED> - The possible values: *ON OFF*.
{<GOSLEEP _VOLT>} {<WAKEUP _VOLT>} – threshold voltage on the battery to go to sleep and to wake from sleep. Values are specified only when IS_ENABLED = ON. Minimum voltage transition into sleep mode shall be not less than the minimum difference of 9V, voltage thresholds (hysteresis) shall be not less than 0.1 in.

Example:
Request: *set extaccsleep on 10 12;get extaccsleep*
Answer: OK ON 10.000 12.000 OK

31. SIM-card ICCID (get iccid)

Command format:
get iccid

Description:
The opportunity to obtain this identifier may not always be available, for example, a negative balance or, in the absence of communication. In these cases, the command can return Ansver "NA".
Example:
Request: *get iccid*
Answer: 89701012656602779599 OK

32. Mobile Network location data (get lbsdata)

Command format:
get lbsdata

Description:
Applies only with *"get"*.
Ansver:
<RXL> <MCC> <MNC> <CellID> <LAC> <TA> OK
<RXL> - Receive quality, dBm.
<MCC> - Mobile Country Code
<MNC> - Mobile Network Code.
<CellID> - CID
<LAC> - Location Area Code (HEX)

<TA> - Timing Advance.
If the data is unavailable or there is no GSM signal, then the command returns Ansver NA OK

Example:
Request: *get lbsdata*
Answer: -35 250 1 B08 BBA 255 OK

33. Track points registration by acceleration (set/get drivequal)

Command format:
set drivequal <NET> <en> <G>
get drivequal <NET>

Description:
<NET> - network status:
HOME – settings for the home networking zone,
ROAMING – settings for roaming zone.
<en> - permission flag (*on, off*)
<G> - acceleration threshold above which will register an extraordinary point of the track is defined with a precision of 0.1.The possible values from 1.1 to 8.0.
The "get" command returns *<en> <G>*

Example:
Request: *set drivequal home on 5.4;get drivequal home*
Answer: OK ON 5.4 OK

34. Track points registration by iButton ID (set/get ibevent)

Command format:
set ibevent is1 is2 is3 is4 is5 is6 is7 is8
get ibevent

Description:
Registers the point track in obtaining ID from the iButton or Matrix.
Description:
is1..is8 – permits the registration point for the corresponding slots OW1..OW8.
The possible values: ON, OFF.

Example:
Request: *set ibevent on on off off on on off off;get ibevent*
Answer: OK ON ON OFF OFF ON ON OFF OFF OK

35. «Delta Eurosens» flow meter settings (set/get esnsparam)

Command format:
set esnsparam {<N1>}..{<N39>}

get esnsparam

Description:
<N1>..<N39> – the list of parameters to send to the server.

Example:
Request: *set esnsparam 10 11 12 15;get esnsparam*
Answer: OK 10 11 12 15 OK

36. «Delta Eurosens» flow meter data (get esnsdata)

Command format:
get esnsdata {<N1>}..{<N39>}

Description:
Applies only with *"get".*
<N1>..<N39> – list of read parameters.

Example:
Request: *get esnsdata 2 1 3 4 5*
Answer: 0 90 1 118 0 OK

37. «Delta Eurosens» flow meter black box capacity (get esnsspace)

Command format:
get esnsspace

Description:
Applies only with *"get".*
The command returns the amount of memory available for recording in the black box with the current settings.

Example:
Request: *get esnsspace*
Answer: 43 OK

38. White and black list of mobile network operators (get/set oper pr/dis)

Command format:
set oper pr [<OPER_PR1>] .. [<OPER_PR20>]
set oper dis [<OPER_DIS1>] .. [<OPER_DIS10>]
get oper pr
get oper dis

Description:

Command allows you to create a list of priorities and prohibited operators of GSM roaming.
<OPERS_PR>, <OPERS_DIS> - codes of priority and prohibited operators. Codes are specified via space. You can save 20 priority and 10 prohibited codes.

Example:
Request: *set oper pr 25001 357798 333888 25002 33445;get oper pr*
Answer: OK 25001 357798 333888 25002 33445 0 0 0 0 0 0 0 0 0 0 0 0 0 0 OK
After the command *set oper pr/dis* previous operator codes are reset.
To clear the tables of codes of operators can send the commands without the list of operators:
Request: *set oper pr;set oper dis*
Answer: OK OK

Check the result by using the commands *get oper pr;get oper dis*.

Request: *get oper pr;get oper dis*
Answer: *0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 OK 0 0 0 0 0 0 0 0 0 0 OK*

39. Operation mode of universal ports (get/set iomode)

Command format:
get iomode
set iomode <ionum> <mode>

Description:
Returns the mode of operation of universal ports.
<iomode1> - Universal port operation mode № 1
<iomode2> - Universal port operation mode № 2
A list of profiles, see the description of command "set iomode"

Parameters:
<ionum> : - the port number
1 - Universal port № 1
2 - Universal port № 2
<mode> : Universal port operation mode
ain <fltr> - analog input mode (0..30 V). This mode has an optional parameter - the filtering value [0..10]. If this parameter is absent or equal to zero, filtering is disabled. If the parameter value is greater than zero, then a smoothing filter is applied to the measured values.
ignctrl - ignition control (only one of the inputs)
freq - frequency input (0..40000 Гц)
lowfreq - low frequency mode (0 .. 40 Hz, 0.1 Hz increments)
cntrise <fltr> - counter on the rise of pulse. This mode has an optional parameter - debounce time [0..100]. If the parameter is absent or equal to zero, the filter is disabled. If the parameter value is greater than zero, then the terminal applies an anti-debounce filter.
cntfall <fltr> - counter on the fall of pulse. This mode has an optional parameter - debounce time [0..100]. If the parameter is absent or equal to zero, the filter is disabled. If the parameter value is greater than zero, then the terminal applies an anti-debounce filter.
din - discrete input
enc - Encoder mode

dout_on - digital output: output is shorted to ground (open collector)
dout_off - digital output: output free (open collector)
ibutton <owslot> - discrete output: iButton triggered. This mode has a mandatory parameter - the slot number of 1-Wire, the appearance of the key in which will cause the switching of the output.
The possible values параметра: *ow.1 .. ow.8*
alarm <txtmsg | notxtmsg> - alarm button. If *txtmsg* is specified as a parameter, the track point will be registered when the alarm button is pressed and a text message is generated indicating the universal port on which the alarm button worked, as well as the date and time of the alarm button activation. If *notxtmsg* is specified as a parameter, only the track point will be registered when the alarm button is triggered. A text message is not generated.
Note. Because the encoder mode assumes the use of two universal ports of the tracker (io1 + io2), it is impossible to enable the encoder mode for that pair of universal ports of the tracker, one of whose ports is used for connecting the alarm button, as an ignition control input or an output controlled by the iButton key. When trying to turn on the encoder mode, the tracker will generate warnings : "WARN : Alarm input", "WARN : IgnCtrl input" или "WARN : iButton out".

Example:
Request: *get iomode*
Answer: ain freq OK
Request: *set iomode 1 ain*
Answer: *OK*

40. Universal port data (get iodata)

Command format:
get iodata

Description:
<iodata1> - universal port data № 1
<iodata2> - universal port data № 2

For the "Analog Input" mode, the voltage value is output with three decimal places. For "Counter", "Encoder", "Frequency Input", "Digital Input" and "Digital Output" modes, the value is displayed as an integer. For the "Low-frequency measurement" mode, the value is given with one decimal point. For a list of modes, see the command description "*set iomode*".

Example:
Request: *get iodata*
Answer: *12.346 2345 OK*

41. Setting the odometer mode (get/set odmmode)

Command format:
get odmmode
set odmmode <mode>

Description:

The command allows you to configure the odometer value sent to the statistics server.
<mode> is the type of value sent to the monitoring server. Possible values:
“ABS” - send the absolute value to the statistics server (in kilometers with a 1-m resolution),
“REL” - send a relative value to the statistics server (in meters with 1 mm resolution).

Example:
Request: set odmmode REL;get odmmode
Answer: OK REL OK

42. Getting the odometer value (get odometer)

Command format:
get odometer

Description:
Applies only with *"get".*
The command allows to get the total traveled distance in meters. To reset the odometer, use the *‘reset odometer’* command.

Example:
Request: *get odometer;reset odometer*
Answer: 665452 OK Reset odometer OK

43. Enable/disable track points unloading in roaming (get/set roamingupload)

Command format:
set roamingupload <on/off>
get roamingupload

Description:
The command allows you to disable or enable track points unloading while roaming.

Example:

Request: *set roamingupload on;get roamingupload*
Answer: OK ON OK

Diagnostic commands

1. GPS module diagnostics (diag gps)

Command format:
diag gps

Description:
The command returns the following GPS module diagnostic data:
<stInit>,<maxTI>,<nMRst>[R1:R2:R3:R4],<nBRst>,<nSTout>,<nTaf>,<mDt>,<nRxMsg>
[M1:M2:M3:M4:M5:M6:M7:M8],<nIES>,<fM> [fM1: fM2: fM3: fM4: fM5: fM6: fM7: fM8]
<stInit> - GPS module initialization status (nominal state is 0x1f)
<maxTI> - maximum time of the last GPS module initialization in seconds.
<nMRst> - the number of reloads of the GPS module since the power was turned on;
R1 – number of manual module restarts;
R2 – number of restarts due to long absence of coordinates;
R3 – number of restarts due to the receipt of the wrong time from the module;
R4 – number of module hangs;
<nBRst> - number of restarts of the receiving buffer;
<nSTout> - number of delays in the arrival of data from the module;
<nTaf> - the number of cases of the desynchronization of the GPS time and tracker, two numbers mean the number of cases of the clock out of synchronization "into the past" and "into the future" relative to the internal clock of the tracker;
<mDt> - maximum desync time in seconds;
<nRxMsg> - number of received and processed messages from the module;
<M1..M8> - the number of received messages with the prefixes "GGA", "GLL", "GSA", "GSV", "RMC", "VTG", "ZDA", "$PMTK" respectively.
<nIES> - the counter of successful and erroneous reinitializations and the counter of hibernation;
<fM> - the average number of messages received from the module per second (should be about 10);
<fM1..fM8> - the average frequency of messages with prefixes "GGA", "GLL", "GSA", "GSV", "RMC", "VTG", "ZDA", "$PMTK".

Example:
Request: *diag gps*
Ansver: stInit=0x1f,maxTI=7,nMRst=2[0:1:0:0],nBRst=1,nSTout=0,nTaf=0,1,mDt=1,nRxMsg=131355,131354, [14063:0:28128:75098:14064:0:0:1] nIES=2,0,0,fM=9.33,[1.00:0.00:2.00:5.33:1.00:0.00:0.00:0.00] OK

If the GPS module is correctly initialized, the *stInit* parameter must be 0x1f, the initialization time of the module is a few seconds, in this case 7 seconds. There should be no spontaneous module restarts, a low frequency of messages from the module (fM <8) indicates problems with receiving signals from satellites.

2. Statistics of the RS485 slot (diag rs485)

Command format:
diag rs485 {N_SLOT}

Description:

N_SLOT = 1..8. The value 1 corresponds to slot R4.1, Value 8 corresponds to slot R4.8).
The command returns the counter for executing the main cycle of the application thread responsible for the RS485 bus (nLps); the number of successful data requests on the bus (OkRq); The number of read / write errors for each slot (SlotIoFails) is listed through the colon; slot, which will display the I/O buffers in hexadecimal form (Slot); Transmit slot buffer (TxBuf); receive slot buffer (RxBuf).

Example:
Request: *diag rs485 1*
Ansver: nLps=404513,OkRq=404514,SlotIoFails=0:0:0:0:0:0:0:0,Slot=R4.1 TxBuf:0x3101066C, RxBuf:0x3E010600550D85CD64 OK

3. Statistics of the internal clock (diag rtc)

Command format:
diag rtc

Description:
Ansver: <DateTime>, TTime =<TTime>, OTime=<OTime>, SGsm=<SGsm>, SGps=<SGps>, MaxDSyns=< MaxDSyns >, TimeMaxDSyns=<TimeMaxDSyns>
<DateTime> The current system date and time, this data can be used to compare the system time of the tracker and the time coming from the navigation satellites. In this case, it is appropriate to send two commands at the same time: get datetime; diag rtc. The time difference is not more than 1 second if there is a signal from the satellites. If the discrepancy is significant, then you need to enable the system time auto-tuning mode (see *set trimrtc*)
<TTime> - Total time of the tracker in seconds from the moment of restart;
<OTime> - The total operating time of the OS scheduler. The ratio of OTime / TTime should not be less than 0.99;
<SGsm> - Event counter for adjusting the system time for base stations. Ideally, this parameter should be 0 or 1 if there is a signal from satellites;
<SGps> - The counter of events of adjustment of system time by satellites. Ideally, this parameter should be 1.
<MaxDSyns> - maximum time of out of sync system time and UTS,
<TimeMaxDSyns> - UNIX time of the maximum time out of sync with UTS.

Example:
Request: *diag rtc*
Ansver: 7.03.18 07:40:44,TTime=404934,OTime=404528,SGsm=6,SGps=7,MaxDSyns=7,TimeMaxDSyns= 1521964902 OK

4. Statistics of GSM module operation (diag gsm)

Command format:
diag gsm

Description:
Ansver:

timeOn=<timeOn>,timeGsm=<timeGsm1>(<timeGsm2>),timeSrv=<timeSrv1_0>(<timeSrv2_0>),<timeSrv1_1>(<timeSrv2_1>),<timeSrv1_2>(<timeSrv2_2>),<timeSrv1_3>(<timeSrv2_3>),Vcc=<Vcc>[VccMin..VccMax],Rst=<Rst>,nSrvConn=<nSrvConn0><nSrvConn1><nSrvConn2><nSrvConn3>,nRxTcpPkt=<nRxTcpPkt0><nTxTcpPkt1>< nTxTcpPkt2>< nTxTcpPkt3> SimTxBuf: <SimTxBuf> SimRxBuf: <SimRxBuf> OK

<*timeOn*> - total time (sec) of continuous work of the tracker for the last day;
<*timeGsm1*> - time (sec) of a continuous location in the coverage area of the GSM network;
<*timeGsm2*> - total time in the network for the last 24 hours or after the power supply;
<*timeSrv1_0.. timeSrv1_3*> - time (sec) of continuous communication with the monitoring server 0..2 or with the update server (connection №3);
<*timeSrv2_0.. timeSrv2_3*> - the total time spent on communication with the statistics server 0..2 or with the update server (connection №3) for the last day or after the power supply;
<*Vcc*>, <*VccMin*>, <*VccMax*> - current, minimum and maximum supply voltage of the GSM module in millivolts;
<*Rst*> - number of GSM program reset;
<*nSrvConn0.. nSrvConn3*> - the number of attempts to connect to the monitoring server (0..3) and the update server (connection №3);
<*nRxTcpPkt0.. nRxTcpPkt3*> - the number of TCP packets received from the monitoring server and the update server (connection №3). The number of sent points can be requested using the *diag protocol* command.
<*SimTxBuf*> - the last sent command to the GSM-module (no more than 25 characters, all others are cut off);
<*SimRxBuf*> - the last received Ansver from GSM-module (no more than 25 characters, all others are cut off).
Statistics is reset after 84,600 seconds (day) after the tracker is turned on or restarted and accumulated again.

Example:
Request: *diag gsm*
Ansver: tOn=58754,tGsm=27424(54165),Vcc=4202[3900..4213],Rst=3,tSrv=101(53990) 0(0) 0(0) 0(0) nSC=7 0 0 0 nRxTcp=3493 0 0 0 simTxBuf: simRxBuf: OK

5. Statistics of the black box (diag bbox)

Command format:
diag bbox

Description:
The command returns the statistics of work with the black box.
Ansver: PF=<PF0 PF1 PF2 PF3 PF4>, PC=<PC0 PC1 PC2 PC3 PC4>, RS=<RS0 RS1 RS2 RS3 RS4>, Ri=<Ri>, RL=<RL>, WS=<WS>, ERR=<ERR>, Cl=<Cl>, TL=<TL>,DT=<DT>,OTW=<OTW>

<PF0..PF3> - the number of entries in the black box at the time of the start of the software for each statistics server and for uploading through the configurator (PF3);
PF4 – number of points with an unsynchronized time at the time the tracker was launched
<PC0..PC3> - the current number of unsent records for each server;
PC4 – number of points with an unsynchronized time at the current moment
<RS0..RS4> - counters successfully read entries;

<Ri> - re-initialization counter;
<RL> - counter of instances of cancellation of reading of a point (for prevention of overflow of the TCP-buffer);
<WS> - the counter of successfully saved points (each point is saved simultaneously for all servers);
<ERR> - error counter;
<Cl> - full erasure counter;
<TL> - Unix time of the moment when the point was recorded after the last longest recording delay.
<DT> - The maximum delay between the record points after the restart of the tracker. In normal operation, this number must not exceed the value of the interval parameter for recording points during parking;
<OTW> - the counter of the delayed recording of the point for a time longer than 10 seconds after the moment of recording according to the schedule.

Example:
Request: *diag bbox*
Ansver: PF=0 0 0 0 0 PC=0 0 0 0 0 RS=2285 0 0 0 0 Ri=1 RL=68 WS=2258 ERR=0 Cl=0 TL=1522105225 DT=183 OTW=0 OK

6. Statistics of sending points to the server (diag protocol)

Command format:
diag protocol

Description:
Ansver:
PT=<PT0 PT1 PT2 PT3>,PS=<PS0 PS1 PS2 PS3>,PD=<PD0 PD1 PD2 PD3>,BI=<BI0 BI1 BI2 BI3>
<PT0.. PT3> - total number of sent points, incl. repeated
<PS0..PS3> - the number of successfully sent out points should coincide with the number of successfully readings;
<PD0..PD3> - number of sent fragments of TCP records, is relevant for version with support for PressureProPulse;
<BI0..BI3> - Number of re-initializations due to unrecognized record types.
This command is recommended to be used together with the command *diag bbox.*

Example:
Request: *diag protocol*
Ansver: PT=2288 0 0 0 PS=2261 0 0 0 PD=0 0 0 0 BI=0 0 0 0 OK

7. Track points registration statistics (diag track)

Command format:
diag track

Description:
Ansver: Total:<Total> 0:<0> 1:<1> 2:<2> 3:<3> 4:<4> 5:<5> 6:<6> 7:<7> 8:<8> 9:<9> A:<A> B:<B>
<Total> - total number of registered points
<0> - number of point registration errors
<1> - the first point after the power supply, must always be a value of 1

<2> - the number of points registered with the iButton ID change
<3> - the number of points registered by a change in direction (azimuth)
<4> - number of points registered by distance
<5> - the number of points registered by the event "Start"
<6> - the number of points registered by the event "Stop"
<7> - number of points registered by time
<8> - the number of points registered for overspeeding
<9> - the number of points registered by pressing the "alarm button"
<A> - number of points recorded for exceeding acceleration
<B> - the number of points registered by changing the status of the ignition.
After one of the counters reaches the value of 65535, all the counters are reset.

Example:
Request: *diag track*
Ansver: Total:2261 0:0 1:1 2:0 3:919 4:243 5:245 6:555 7:298 8:0 9:0 A:0 B:0 OK

Additional parameter data

№	Parameter	Description
1	pwr_ext	vehicle voltage
2	aux	A 32-bit word is displayed in hexadecimal. It is intended to display additional information about the current status and diagnose problems. A 32-bit aux field is treated as a collection of bit fields. Each area of significant bits in a word has its purpose: Bits 0..3 define the record number in a packet with coordinate points sent to the Wialon server Bits 4..19 - the number of the packet sent to the Wialon server Bits 20..27 - the event by which the track point is registered. The possible values: 0x01 - First registered point with valid coordinates 0x02 - Point registered with iButton event 0x03 - The point is registered by the rotation angle 0x04 - The point is registered for the distance traveled 0x05 - Point registered for stop 0x06 - Point registered at start 0x07 - The point is registered for idle time 0x08 - The point is registered by overspeeding 0x09 - The point is registered by the alarm button 0x0A - The point is registered by exceeding the specified acceleration 0x0B - Point registered for ignition on / off Bits 28..31 - Validity of the determination of coordinates (0 - coordinates are not valid, 1,2 - coordinates are valid)
3	F1, F2	The frequency measured at the frequency input 1 or 2
4	R2.1	RS-232 data
5	R4.1…R4.8	RS-485 corresponding slot data
6	OW.1…OW.8	1-Wire corresponding slot data
7	R4.1.1,R4.1.2 … R4.8.1,R4.8.2	Data from the sensors when obtaining pair parameters
8	P1 … P34	Tire pressures when using PressurePro.
9	T1 … T34	Temperature of the tire (temperature zone number) when using the PressurePro
10	Gsim	SIM card activity: 1 - sim card active, 0 - sim card is inactive or not installed.
11	Grssi	GSM signal strength. (0 ... 31)
12	Gregst	The status of registration in the network: 0 - no network, 1 - home network, 2 - network search, 3 - operator refused registration, 4 - unknown status, 5 - roaming.
13	Gcipst	A three-bit number. Bit 0..2 - connection activity status 0..2. The set bit indicates that there is a connection to the servers 0..2.
14	Gsrvst	A three-bit number. Bit 0..2 - authorization status on the server 0..2. 0 - no authorization, 1 - authorization is passed.
15	Gupdst	0 - the software is not updated, 1 - the software update is in progress.
16	Accel	The acceleration value in units of G (0.00 ... 13.00), while the values are up to 8G.
17	StAccel	Vehicle motion status (0 - unknown state, 1 - movement, 2 - stop or parking mode, 3 - sharp turn)
18	Ign	Ignition status (0 - ignition off, 1 - on)
19	Odm	Odometer reading in meters
20	ES1..ES39	Eurosens Delta RS100 flow sensor parameters

List of supported devices and protocols

№	Device type	Interface	Protocol	Data type	Sensor name
1	DUTOMNI	RS485	LLS	FREQ TEMP FUEL	Mielta ДУТ-3404
2	DUTOMN2	RS485	LLS	FREQ TEMP FUEL	Omnicomm LLS30160
3	IBUTTON	1-Wire	iButton	ID	Dallas DS-199x
4	DS1820	1-Wire	DS1820	TEMP	Mielta ДТ-3402
5	DUMLT	RS485	Mielta	ANGLE	Mielta ДУ-3403
6	LCDMLT	RS-485	Mileta	STATUS	Mielta ДС-1502
7	MATRIX	1-Wire	iButton	ID	Iron-Logic MATRIX III
8	RFIDMLT	1-Wire	Mielta	ID	Mielta СРМ-3303-04
9	AUTOSNS	RS-485	LLS	TEMP PARAM1 PARAM2	ДУТ-КВ-Р01
10	ZET7012	RS-485	Modbus	PRESS	Zetlab Zet7012
11	RFMLT2	RS-485, 1-Wire	Mielta, iButton	ID	Reader RFID Mielta