Limited liability company
«Santel-Navigatsiya»

◉ ЭРА ГЛОНАСС

Approved МРСВ.464514.007-22-ЛУ

Accident Emergency Call Device
(AECD)
7.22

USER MANUAL

МРСВ.464514.007-22 UM

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CHANGE REGISTRATION SHEET

Date	Document version	PDM version	Notice of change in PDM	Full name
12.12.2022	12/12/2022	0.2	MPCB.1.003-2022	I. Ignatov
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This User Manual MPCB.464514.007-22 UM familiarizes the user with AECD 7.22 and its intended use.

This User Manual provides sufficient information for the service personnel training.

The Device operator does not need any special radio technical training.

When the Device is installed in the vehicle, it functions autonomously and does not require constant attention from the user.

The Device does not pose any danger to the environment.

This Manual is considered up to date at the time of its composition and cannot entirely reflect changes to the Device or its firmware that were enacted at a later date.

If this Manual changes due to the updates in the Device design and/or its firmware, the Manual must be reconciled.

This document uses the following definitions and abbreviations:

AECD	-	Accident Emergency Call Device
GLONASS	-	Global navigation satellite system
GPS	-	Global Positioning System
GSM	-	A global standard for digital mobile cellular communications including time division multiple access (TDMA) and frequency division multiple access (FDMA)
GPRS	-	An add-on over GSM mobile communication technology that implements packet data transmission
UMTS	-	Universal Mobile Telecommunication System
LTE	-	A wireless high-speed data transmission standard for data terminals
MDS	-	Minimal Data Set
ERS	-	Emergency Response Service
ERA-GLONASS	-	Russian state emergency response system
RTI	-	Road Traffic Incident
AECS	-	Accident Emergency Call System
ICCID	-	Unique serial number of the SIM-chip
IMEI	-	Unique serial number of the GSM modem
QR-code	-	Matrix barcode containing information about the object

1. DESCRIPTION AND OPERATION

1.1. Device Description and Operation

1.1.1. Device Designation

AECD 7.22 MPCB.464514.007-22, further in the text – Device, is an accident emergency call device. The Device is intended for manual call to the emergency response service operator; minimal data set (MDS) transmission including the vehicle characteristics, location coordinates, time and direction of movement; the Device also provides hands-free communication between the vehicle users and the ERA-GLONASS state automated system operator.

The Device is made in the configuration of standard equipment installed on M and N-class vehicles in accordance with the international classification system.

1.1.2. Technical Specifications

1.1.2.1. General characteristics of the GLONASS/GPS receiver:

– numbers of channels – at least 16;
– location data update rate – 1 Hz;
– GLONASS/GPS antenna type – internal.

1.1.2.2. The Device works in the following ranges: GSM-900/1800, UMTS-900/2000, LTE-800/1800/2600. Transition from one range to another is automatic.

1.1.2.3. Transmitter power levels:

– GSM 900 – class 4, 2 W (33 dBm);
– GSM 1800 – class 1, 1 W (30 dBm);
– UMTS 900/2000 – class 3, 0.25 W (24 dBm);
– LTE 800/1800/2600 – class 3, 0.25 W (24 dBm).

1.1.2.4. SM/UMTS antenna type – internal, planar inverted F-antenna (PIFA).

1.1.2.5. SIM-card type – resident (non-removable) multi-profile SIM-card installed on a printed circuit board using SMD technology (SIM-chip).

1.1.2.6. The Device is designed to be connected directly to the car battery with a nominal voltage of 12V.

If the Device disconnects from the power source in the «Emergency Call» mode, the Device will run on a built-in battery.

The ignition input line is designed to give a logical control signal. Logical zero (ignition is off) - voltage from 0 to +2 V, logical unit (ignition is on) - voltage from +9 to +14 V.

1.1.2.7. Connecting the Device to an external power supply with an output voltage other than that specified above is not permitted.

The power supply system of the Device should meet the following requirements:

–   protection against reverse polarity of the supply voltage;

–   automatic Device switch on upon being connected to a power supply net;

–   automatic correct shutdown of the Device when power is turned off.

1.1.2.8. Limiting temperature:

–   minimum: - 40 ^{0}C;

–   maximum: + 85 ^{0}C.

1.1.2.9. Working temperature:

–   when powered by the on-board power system – from -40 ^{0}C to +85 ^{0}C;

–   when powered by internal backup battery – from -20 ^{0}C to +85 ^{0}C.

1.1.2.10. The Device is designed taking into account the requirements of GLONASS and GLONASS/GPS satellite navigation and meets the following requirements:

–   the Device body provides protection against dust and water penetration as per IP-40, GOST 14254;

–   the connectors used for actuators and/or power connectors are protected against short circuiting;

–   in the event of failure, the Device does not emit heat energy sufficient to ignite the standard equipment of the vehicle, or any substances that could negatively affect human health.

1.1.2.11. In terms of resistance to climatic and mechanical influences, as well as electromagnetic compatibility and resistance to electromagnetic interference, the Device meets the requirements of technical conditions stated in MPCB.464514.007-22 ТУ.

1.1.2.12. Each Device undergoes production tests at LLC «Santel-Navigatsiya». The purpose of the tests is to ensure reliability, quality, functionality of Devices, and to verify the correct operation of the firmware.

1.1.3. Device Components

1.1.3.1. The Device has basic configuration listed in Table 1.

Table1– Basic configuration of the Device

Name	Quantity
TCU (Electronic unit)	1
Cable harness	1
Data Sheet	1

1.1.3.2. External views of the TCU are shown in Figures 1, 2.

1 – status indicator;
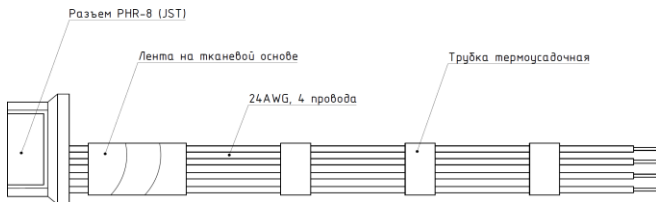2 – microphone;
3 –«SOS» button;
4 – remote speaker.

Figure 1–Top view of the TCU

1 – battery;
2 – battery connector;
3 – cable harness connector;
4 – battery compartment lock;
5 – battery compartment cover.

Figure 2 – Back view of the TCU

1.1.3.3. The cable harness is shown in Figure 3.

Разъем PHR-8 (JST)

Конт.	Цепь	
1	KL.30	красный
2	GND	черный
3	KL.15	белый
4	MUTE-	оранжевый
5		
6		
7		
8		

Figure 3 – Cable harness MPCB.468349.028

1.1.4. Design and Operation

1.1.4.1. TCU components:

— a multifunctional module allowing custom firmware, including:

- receiver of navigation radio signals of GLONASS or GLONASS/GPS satellite constellation;
- receiver/transmitter of cellular mobile communication radio signals supporting GSM/GPRS and UMTS standards;
- tonal (in-band) modem for data transmission within the frequency band of the voice channel;

— resident (non-removable) multi-profile SIM-card installed on a printed circuit board using SMD technology (SIM-chip);

— a backup battery with capacity required to maintain active voice communication for 10 minutes and work in standby mode for at least 1 hour in the absence of external power[1];

— internal GSM/UMTS - antenna;

— internal GPS/GLONASS - antenna;

— voltage stabilizer with backup battery charge manager for powering the electronic components;

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[1] After active voice communication during 10 minutes and operation in standby mode for at least 1 hour in the absence of external power, the battery will be discharged to a critical level and must be replaced. If the battery is not replaced, the performance of the Device is not guaranteed.

— CAN data bus connected to the vehicle's on-board information bus for communication with other electronic systems (the CAN bus is optional, depending on the Device modification);

— electrical connector for connecting to the vehicle's on-board network and communicating with the interface module of the Device.

1.1.4.2. TCU has the following technical characteristics:

— size, mm – 97 x 46 x 24;
— weight, g– 112.

1.1.5. Marking and sealing

The Device is marked with:

— a single mark of circulation on the market of the Member States of the Customs Union;
— serial number of the Device (SN);
— ICCID (unique serial number of the SIM-chip);
— QR-code containing SN, HF, IMEI and ICCID;
— Device name;
— decimal number;
— manufacturing country;
— name of the manufacturer;
— manufacturing date.

The markings are applied to label that is attached to the TCU housing. Device marking meets the requirements of technical specifications set forth in MPCB.464514.007-22 TU.

The cable harness is marked with the designation and date of manufacture.

The marking is applied to a label that is attached to the 3rd heat shrink tube next to the main connector.

1.1.6. Packaging

Device packaging complies with the requirements of the technical specifications set in MPCB.464514.007-22 TU.

Multiple packaging of Devices for individual orders is possible.

2. INTENDED USE

1.2. Operational Limits

2.1.1. The Device is connected to the 12 V car battery (onboard power supply system).

The Device is equipped with an internal battery that does not need replacement during the entire life of the Device. The backup battery requires replacement if there were road traffic accidents and/or emergency calls when the vehicle ignition was off.

2.1.2. Connecting the Device to external power supply with voltage different from the specified above is prohibited.

2.1.3. Installation of the device on a vehicle with a malfunctioned on-board power supply system is not permitted.

2.1.4. Reception of navigation signals from satellites may be hindered if the TCU is installed inside the vehicle compartment that screens radio signals, and if the vehicle is inside a weak GLONASS/GPS satellite signal zone.

Time required to determine the vehicle location may be increased if the Device has been in a zone with poor GLONASS/GPS satellite signal reception for an extended period of time.

1.3. Device Use

2.2.1. Turning the Device on

The Device is turned on when external power is supplied (plus, minus, ignition).

When the Device is first powered up[2] by connecting to the vehicle power supply system, regardless of the ignition state (on or off), the Device turns on and enters a self-diagnosis «ERA» state (see «ERA» indication mode in Table 2).

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[2] When installing the Device at the car manufacturer's factory and/or disconnecting the external power supply (for example, in case of battery replacement)

The Device mode indication at the first power-up has the following sequence:

1) lights up red (3 to 10 seconds);

2) lights up green (40 to 45 seconds);

3) blinks red 2 times.

If the ignition is turned on, the Device will remain in «ERA» mode until the ignition switches off.

If the ignition is turned off, the Device will exit the «ERA» mode and turn «Off» after a while.

On subsequent switching on, if the external power has not been turned off, the Device will switch to the «ERA» mode.

IMPORTANT: If you disconnect the Device from external power, the following powering up of the Device will lead to the mode indication corresponding to the first power supply.

2.2.2. Operating modes

The Device has the following operating modes:

— «Off» mode;

— «ERA» mode;

— «Emergency call» mode;

— «Service» mode;

— «Test» mode.

2.2.2.1 «Off» mode

The Device is in the «Off» mode when the vehicle ignition is off. The Device exits the «Off» mode when the ignition is turned on.

2.2.2.2. «ERA» mode

In the «ERA» mode, the Device detects and registers vehicle parameters, detects accident events and provides a response to the user's control actions. The Device is in «ERA» mode when the vehicle's ignition is turned on for the first time, as well as after the end of the «Test» mode or termination of the «Emergency call» mode.

2.2.2.3. «Emergency call» mode

The «Emergency call» mode is designed to transmit MDS and establish a voice connection between vehicle users and the ERS contact center operator. The «Emergency call» mode is performed in manual mode by pressing and holding the SOS button for at least 3 seconds.

To exit the «Emergency call» mode initiated in manual mode, press the «SOS» button once at the stage of establishing a connection (if the connection with the ERS operator has not yet been established), and the emergency call will be terminated.

When the «Emergency call» mode is initiated, the Device will enter the «ERA» mode after the emergency contact center operator terminates the call.

In case the external power supply switches off during the call, the Device continues operating on the backup battery that is enough for 10 minutes of a voice call and for at least 1 hour of operation in standby mode.

2.2.2.4. «Service» mode

The «Service» mode is designed to disable all functions of the Device while the vehicle is in the service center and/or to do repair work.

The «Service» mode is entered by pressing the SOS button 5 times within 5 seconds. You need to press the SOS button after the voice prompt informing about entering the «Service» mode. If the SOS button is not pressed within 5 seconds after the voice prompt, the Device will enter the «Test» mode.

In the «Service» mode, the Device status indicator lights up green, blinks red 3 times every 2 seconds, and the remote speaker emits audible signal sounds every 7 seconds.

Exit from the «Service» mode is performed:

— after pressing the «SOS» button;
— when the external power is turned off;

Notes:

1.   When carrying out repair work or maintenance on cargo vehicles with the need to tilt the vehicle cab, the Device must be switched to the «Service» mode.

2.   After completion of repair work or technical maintenance of the vehicle, the Device must be put into normal operation.

2.2.2.5. «Test» mode

The «Test» mode is intended to check the performance of the Device with an option to transmit the test results to the ERA GLONASS system operator.

The «Test» mode is entered by pressing the «SOS» button 5 times within 5 seconds. After the voice prompt offering to enter the «Service» mode, wait 10 seconds without pressing the «SOS» button.

In the «Test» mode, the Device status indicator lights up green and blinks red 3 times every 2 seconds.

To complete the test, follow the voice prompts.

Exit from the «Test» mode is performed:

—   after transferring of MDS with the Device test results to the ERA GLONASS system operator;

—   when the external power is turned off.

2.2.3. Indication of Device operating modes

A LED status indicator (see Picture 1) indicates the operation of the Device.

When the Device is powered up, the status indicator lights up red for 3-10 seconds. If the self-test is passed successfully, the Device goes to the «ERA» mode.

If the self-test detects a malfunction of the internal components, the Device indication goes into the «AECD malfunction» mode, and the indicator lights up red continuously.

If the Device has diagnosed a malfunction of internal components, please contact the service technician for the Device maintenance, or the service representative of the manufacturer.

Possible Device status indications are listed in Table 2.

Table 2 - Device operating mode indication

Operating mode	Indication
AECD turning on after the ignition is turned on	Lights up red for 3 to 10 seconds.
«ERA» mode	Lights up green when internal diagnostics are successful. Lights up red if there is a malfunction.
AECD malfunction	Lights up red continuously. The malfunction code can be read via CAN bus or USB connection.
The cellular operator's network is temporarily unavailable	Five short red blinks (5 Hz) and an optional voice prompt «The cellular operator's network is temporarily unavailable».
Establishing connection in «Emergency call» mode Sending MDS in «Emergency call» mode	Slow blink red/green (1 Hz). Optional voice prompt informs about mode: — «Establishing a connection»; — «Transferring data to the system».
Voice connection in the «Emergency call» mode	Lights up green continuously. Optional voice prompt «Connection established».
«Test» mode	Lights up green, three short red blinks (5 Hz), 2 second pause, repeat.
«Service» mode	Lights up green, three short red blinks (5 Hz), 2 second pause, repeat. Every 7 seconds there is an audible signal

2.3. Safety Measures

The Device operates on the vehicle's on-board power supply system with a rated voltage of 12 V.

If there is a malfunction in the Device operation, please contact the service center. Do not try to repair the Device yourself.

3. TRANSPORTATION AND STORAGE

The Device must be transported in a packaged form, in closed containers, at an ambient temperature from -40 ºC to +60 ºC. Transportation conditions must correspond to the specifications set in Group C(2) in Table 2 of GOST R 51908.

The Device must be stored in a packaged form, in accordance with the storage conditions 2 of Table 1 of GOST R 51908 (stored in heated warehouses, at temperatures from 5 ºC to 40 ºC and relative humidity not exceeding 60%).

If you plan to store the Device for a long time (more than 6 months) in a warehouse, it is recommended to disconnect the battery connector from the Device during storage to avoid deep battery discharge.

4. DISPOSAL

The Device does not contain any hazardous or poisonous substances that can cause harm to human health or the environment, and does not pose a danger to human life and health or to the environment after the end of its service life.

Disposal of the Device is carried out in accordance with the current, in effect at the given time, rules for disposal of general industrial waste in your region (country).

Before disposal, remove the battery from the Device and send it to an appropriate collection point.