ALARM MICROWAVE QUICKLY-DEPLOYED SYSTEM "FORTEZA-12"

Description & Operating Manual

4372-43071246-007 TO

2003

CONTENTS

1. INTRODUCTION

The present description and operating manual 4372-43071246-007 TO contains information about the alarm microwave quickly-deployed system “Forteza-12” (hereinafter referred to as the system). In the description there is information required for the system correct operation and its constant keeping ready for operation.

The following abbreviations are used in the present document:

Tx - a local transmitter;

Rx - a local receiver with a radio channel transmitter;

RC Rx - a radio channel receiver;

C - a charger;

DAPS - a data acquisition and processing system;

SB - a storage battery;

BDC - battery discharge control;

AC - automatic control.

2 INTENDED USE

2.1 “Forteza-12” system is a mobile perimeter microwave detector. It is intended to provide temporary protective boundaries up to 1000 m long of different configuration. Communication lines laying is not required. Power supply of the system units is off-line. Alarms are transmitted to RC Rx over a radio channel.

2.2 The system is intended for continuous work up to 7 days minimum at the outdoor temperature +20°C. It keeps operating at the ambient temperature -40…+50°C (local equipment), -20…+50°C (radio channel receiver) and relative humidity up to 98% at the temperature +35°C.

2.3 Chargers included in the system provide charging storage batteries (SB) without their removing from the units.

2.4 A charger is intended for continuous indoor operation at the ambient temperature 0…+50°C, thereto, the optimal temperature range is +15…+35^{o}C when charging SB.

3 SPECIFICATIONS

3.1 The maximum number of the sectors in the system is 20.

3.2 The detection zone length of one sector is 5…50 m.

3.3 The detection zone width of the sector at the maximum length is 8 m maximum.

3.4 The system generates an alarm:

- when an intruder circulates in a detection zone to his full height or “bended” at speed 0,3…6 m/sec;
- when there is no signal from Tx including those cases when Tx SB.

3.5 The range of radio channel operation from the most remote Rx to RC Rx in the open area is up to 1000m.

3.6 The radio channel operability is controlled automatically for each sector set to "Automatic control" mode.

3.7 RC Rx provides the following types of display:

- digital (semi-segment indicators);
- positional (LEDs) – constant illumination or generation of periodic sequence;
- audible - generation of periodic sequence.

3.8 There are two relay outputs in RC Rx to generate:

- a generalized alarm;
- a combined trouble signal (AC, BDC)

Alarm time is 2 sec. minimum.

Relay output characteristics:

- contact resistance in the closed state is 20 ohms maximum;
- switched current is 0,1 A maximum;
- voltage is 50 V maximum.

3.9 Power supply of:

- local equipment (Rx, Tx) – 6±0,9 V (storage battery);
- RC Rx – 6±0,9 V (SB) or via a charger from 220V mains;
- charger– alternating voltage 50Hz 220V $_{-15}^{+10}$ %.

3.10 The system controls and displays storage battery discharge of each unit of Rx and RC Rx on RC Rx.

3.11 Charger specifications:

- output charging voltage of the channel in the voltage stabilization mode – (6,83 $\pm$ 0,07)V.
- maximum charging current of the channel in the current stabilization mode is 1,15A maximum.

3.12 Time of the system operation from storage batteries without their recharge:

- at the temperature 20˚C – 7 days minimum;
- at the temperature 0°C – 5 days minimum;
- at the temperature -40˚C – 2 days minimum.

3.13 The system is electromagnetic interference proof.

3.14 The time of the sector availability for operation after power supply is on (equal to the time of Rx damping) is 4 min. maximum.

3.15 Time of availability for operation after an alarm is generated is 20 sec. maximum.

3.16 Time of the system deployment (20 sectors) is 50 min. maximum.

3.17 Time of the system displacement (20 sectors) is 50min. maximum.

3.18 Maximum time of SB charge is 12 hr maximum.

3.19 Rx, Tx and RC Rx units of different systems **are not interchangeable**.

Note. ***The system components cannot be repaired and recovered at the place of operation. u***

3.20 Dimensions	mm, maximum;		weight, kg, maximum:
- an assembled post	850*80*55	;	0,90;
- a local transmitter	615*Ø95;		1,76;
- a local receiver	615*Ø95;		1,80;
- a radio channel receiver	220*135*80;		2,00;
- a charger	395*280*100;		5,90;
- consumer package:			
- a bag (for 8 supports)	870* Ø250;		1,2;
- a rucksack (for 7 Rx (Tx)	650*400*230;		1,6;
- RC Rx bag	250*150*90;		0,3

4. SYSTEM COMPONENTS

The delivery kit is given in table 4.1

Table 4.1

Symbols	Name	Q-ty items
ЮКСО 07.01.000	Support	22
ЮКСО 07.02.000	Tx (a local transmitter)	11
ЮКСО 07.03.000	Rx (a local receiver)	10
ЮКСО 07.04.000	RC Rx (a radio channel receiver)	1
ЮКСО 07.04.300	Antenna	1
ЮКСО 07.04.400	DAPS cable	1
ЮКСО 07.05.000	C (a charger)	3
	Fusing element ВП1-1В-0,5 А	6
ЮКСО 07.06.000	Remote antenna	1
ЮКСО 07.07.000	Consumer package:	
ЮКСО 07.07.100	rucksack	3
ЮКСО 07.07.200	bag	3
ЮКСО 07.07.300	bag for RC Rx	1
ЮКСО 07.12.000	Transit pack	1 kit
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5. SYSTEM ARRANGEMENT & OPERATION

5.1 System Principle of Operation

5.1.1 The main system component is a bistatic microwave detector. Its principle of operation is to generate a volumetric detection zone in the space between a transmitter (Tx) and a receiver (Rx).

5.1.2 Tx contains two radiators: upper and lower. In Rx there are two receivers of beaming: upper and lower. The detection zone of the sector is formed by one beam between a radiator and a receiver of beaming. Therewith, **the couple radiator-receiver of beaming of one sector must be either upper or lower.**

5.1.3 Each system Rx is marked with two figures ("1" and "2", "3" and "4"…"19"and "20"), one of these figures is referred to an upper receiver of beaming, the other – to a lower receiver of beaming. According to these figures a number is given to a protective sector.

5.1.4 The upper Tx radiator and the upper Rx receiver of beaming can be turned around the angle of azimuth about the lower ones within the 350 ^{o} angle. It provides the creation of protective boundaries of different configuration.

5.1.5 When an intruder enters a detections zone of any sector, Rx generates an alarm indicating the number of this sector (according to an upper or lower receiver of beaming). An alarm is transmitted to RC Rx over radio channel. RC Rx is a data acquisition and display device.

5.1.6 In addition to two alarms Rx can generate two functional reports: a Rx operability report and a Rx SB discharge report.

5.1.7 RC Rx receives and indicates alarms with a sector number and functional reports with the number of RX which generated it as well as it generates a generalized alarm (a sector number is not indicated) and a combined functional report to an external DADS.

5.1.8 RC Rx indicates alarms by displaying "№УЧАСТКА" (i.e. the number of the sector where an alarm is generated from 1 to 20) on the numeric display and by switching a tuneful audio signal. Alarms are reset with "СБРОС" (reset) button.

Sector 20 is displayed by "0" figure.

Alarms are generated in 15-20 sec. until causes of alarms are eliminated.

To heighten reliability each alarm consists of two impulses. Their duration is about 2 sec. The interval between them is 3-4 sec. If an alarm is received and "СБРОС" button (reset button) is pushed before the second alarm impulse is over, a report is reset on the numeric display and repeats right now.

If several alarms are received at one time they are enqueued. After the previous report (alarm) is reset, the following one is displayed automatically.

5.1.9 RC Rx displays functional reports only from those Rxs which are set to "Automatic control" mode. Sectors are set to "Automatic control" mode in pairs relating to one Rx. They are set using 10 buttons "1-2"…"19-20". Each button corresponds to a positional indicator lamp to indicate the state of the sectors. The order of sector setting to "Automatic control" mode is given in Section 8.

5.1.10 If during 4 minutes there are not functional reports about operability from any Rx, RC Rx generates "AC report" by switching a AC indicator and a corresponding positional indicator "1-2" – "19-20", and a audio signal. When displaying functional reports an audio signal differs from an alarm in tone.

RC Rx displays a functional report about SB discharge below 5,35V from any Rx by switching on BDC indicator, corresponding positional indicator “1-2”… “19-20” and an audio signal.

5.1.11 Further this report will be called “BDC report”.

5.1.12 RC Rx controls voltage of its own SB voltage. If its discharge is below 5,35 V, “RC Rx BDC” indicator lamp is ON.

Note. At the moment of RC Rx switching on/off, “RC Rx BDC” is ON for a short period of time.

5.1.13 There are two modes of operation in the complex: standby and alarm. Standby mode is ON when there are not alarms. It is displayed by “-“symbol on the digital display of RC Rx. Alarm mode is displayed by a audio signal and a number of a sector is shown on the numeric display of RC Rx. When power supply is ON, Rx generates two control alarms confirming that power supply is ON. The numbers of sectors of this Rx are specified.

5.2 **Description of the System Structure**

5.2.1 The system structure is given in fig.5.1.

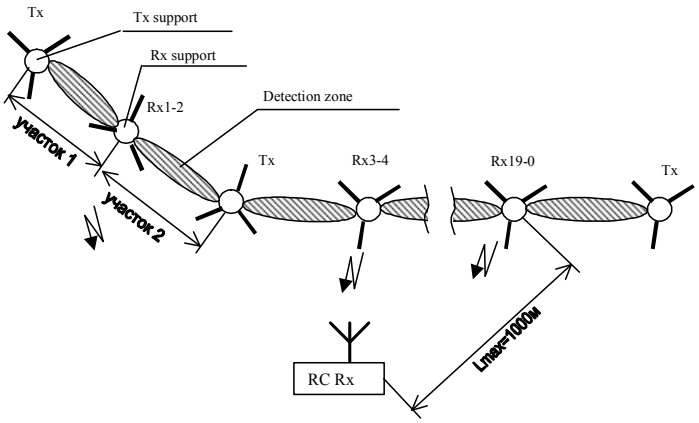


Fig. 5.1

5.2.2 The site protective boundary consists of sectors. Their maximum length is 50 m. Rx and Tx units are mounted on supports. A protective boundary can be closed or open. An open protective boundary is shown in fig. 5.1. In this case **Rxs must be mounted on the outer supports**.

5.2.3 The order of sector arrangement by numbers can be any. The sector is identified by RC Rx under that number which a receiver of beaming of this sector has.

5.2.4 The maximum number of sectors of one system is 20. If a protective boundary is closed, 10 Rxs and 10 Txs are used. There is the 11^{th} transmitter in the system to form an open protective boundary consisting of 20 sectors.

5.2.5 Partial use of the system components is allowed to form short protective boundaries.

Therewith, the minimal quantity of sectors is two because Tx has two receivers of beaming, their power supply is ON simultaneously. If one of the receivers of beaming does not receive signals, it constantly generates alarms.

One protective sector may be formed by two beams. Then both Tx radiators and both Rx receivers of beaming are directed to each other. An alarm from this sector is displayed simultaneously under two numbers.

5.2.6 Several separate independent spaced protective boundaries can be organized.

5.3 Charger Structure & Operation.

5.3.1 Charger has eight independent charging channels of SB. Each storage battery is charged irrespective of the discharge degree the rest of the batteries.

5.3.2 To charge a storage battery Rx (Tx) is connected to one channel of the charger, RC Rx is connected to two channels simultaneously. Three chargers of the system provide simultaneous charge of the storage batteries of all units.

5.3.3 Each channel of a charger is equipped with a PC4 socket to connect to a PC4 plug which can be found on each Rx, Tx and RC Rx.

5.3.4 First the charger provides charging of storage batteries in the restricting mode of the maximum charging current, then in the mode of charging voltage stabilization. The mode is chosen automatically.

5.3.5 Each channel of the charger contains a network transformer, a rectifier, a voltage stabilizer with the maximum current terminator and indicators of operation mode.

5.3.6 Each charger channel two indicator lamps: “NORM” (green) and “CHARGE” (red).

5.3.7 Luminescence of the “NORM” indicator lamp means normal output charging voltage of the channel.

5.3.8 The “CHARGE” indicator lamp is switched during charging a storage battery up to 85…90% rated capacity.

5.3.9 During the system operation a charger can be used as mains power supply source for RC Rx.

6 SYSTEM CONSTRUCTION

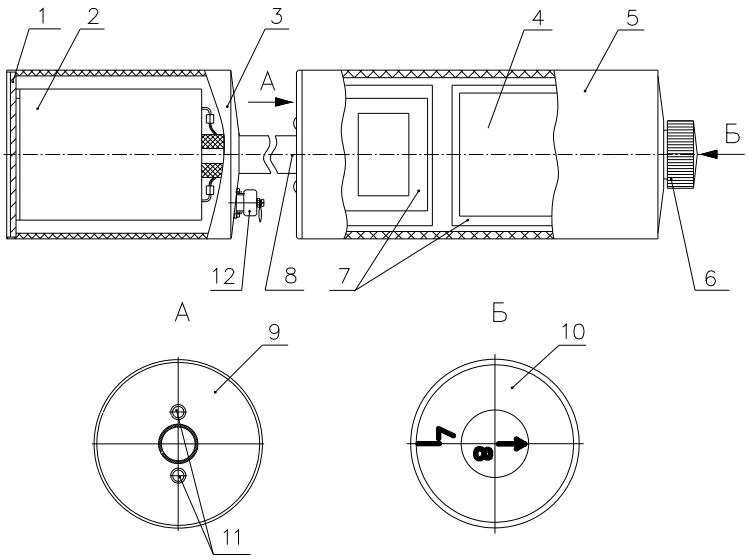
6.1 **Rx Construction (fig.6.1).**

6.1.1 Rx is dust-splash proof. It consists of 2 cylinders 3 and 5 connected with each other by a tube 8.

6.1.2 In the lower cylinder 3 (hereinafter referred to as a storage compartment) there is SB 2. It is accessible when bottom 1 is removed. In the upper cylinder 5 there are two receivers of beaming 7. The lower one is fixed on base 9; the upper one is fixed on handle 6. The axis of the directional pattern of the lower receiver of beaming coincides with a mark on hood 10. Near the mark there is a number of the lower receiver of beaming (odd numbers from “1” to “19”). The directional pattern of the upper receiver of beaming corresponds to the direction of the pointer on handle 6. On the handle there is a number of the upper receiver of beaming (even numbers from “2” to “20”). Using handle 6 the upper receiver of

beaming can be turned to the angle 350° minimum about the lower one. Radio channel transmitter 4 is also located in cylinder 5.

6.1.3 On base 9 there are two buttons of power supply 11; on the cover of the storage compartment there is a PC4 plug to connect charger 12. When SB charging is over, PC4 socket is closed with a cap.



1 – bottom	- 1 item;	8 – tube	- 1 item;
2 – SB	- 1 item;	9 – base	- 1 item;
3 – lower cylinder	- 1 item;	10 – hood	- 1 item;
4 – plate of radio channel transmitter	- 1 item;	11 – power supply button	- 2 items;
5 – upper cylinder	- 1 item;	12 – PC4 socket to connect a	
6 – Rx handle	- 1 item;	charger with a cap	- 1 item.
7 – receiver of beaming (upper and lower)	- 2 items;		

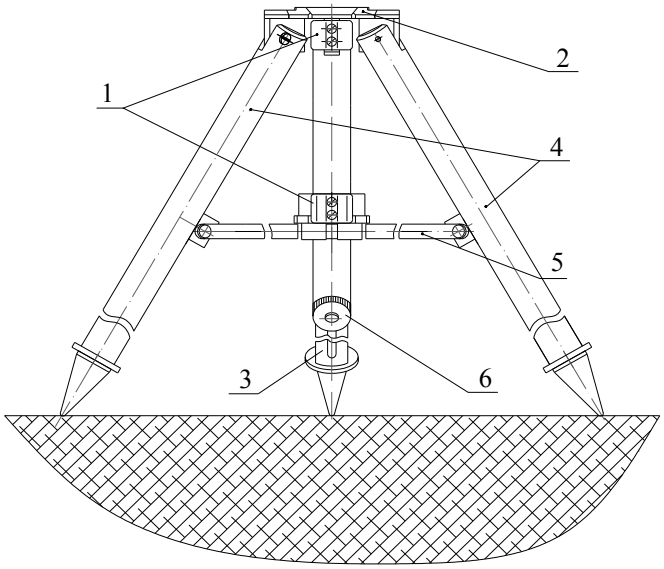
Fig. 6.1

6.2 **Tx Construction**

6.2.1 Tx construction is similar to Rx construction. The difference is that radiators are used in upper cylinder 5 instead of the receivers of beaming; there is no radio channel transmitter.

6.2.2 The axis of the directional pattern of the lower radiator corresponds to the direction of the mark on the cap; the axis of the directional pattern of the upper radiator corresponds to the pointer on the handle.

6.3 **Pole Construction (fig.6.2).**



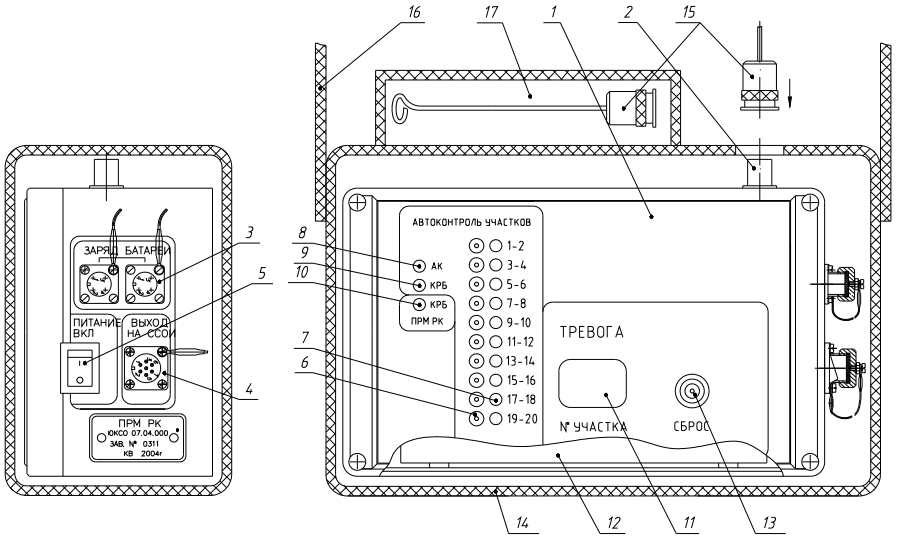
1	– spring	-2 items;
2	– platform	-1 item;
3	– sliding bar	-1 item;
4	– bar	-2 items;
5	– distance-bar	-3 items;
6	– lock screw	-1 item .

Fig. 6.2

6.3.1 The poleis a quickly–deployed tripod. Its base is platform 2; three sliding bars 3 and 4 are fixed on this platform. A sliding bar can be changed in length because of a sliding segment which is fixed in the required position with lock screw 6. When the poleis deployed it is fixed with cross-bars 5. Springs 1 are intended to mount Tx (Rx) when it is mounted on the support.

6.3.2 The view of the pole with mounted Tx (Rx) is given in fig. 6.6.

6.4 **RC Rx Construction (fig 6.3).**



1 – case	1item	9 – “BDC” indicator	1 item
2 – “АНТЕННА” plug-and-socket (“ANTENNA” plug-and-socket)	1 item	10 – indicator “RC Rx BDC”	1 item
3 – “ЗАРЯД БАТАРЕИ” plug-and-socket (“BATTERY CHARGE” plug-and-socket)	2 items	11 – digital indicator	1 item
4 – “ВЫХОД НА ССОИ” plug-and-socket (“OUTPUT TO DADS” plug-and-socket)	1 item	12 – SB	1 item
		13 – “СБРОС” button (RESET)	1 item
5 – “ПИТАНИЕ” switch (“POWER SUPPLY” switch)	1 item	14 – bag	1 item
		15– antenna	1 item
6 – button of the sector automatic control	10 items	16 - band	1 item
7 – indicator of the sector automatic control	10 items	17 – pocket	1 item
8 – “AC” indicator	1 item		

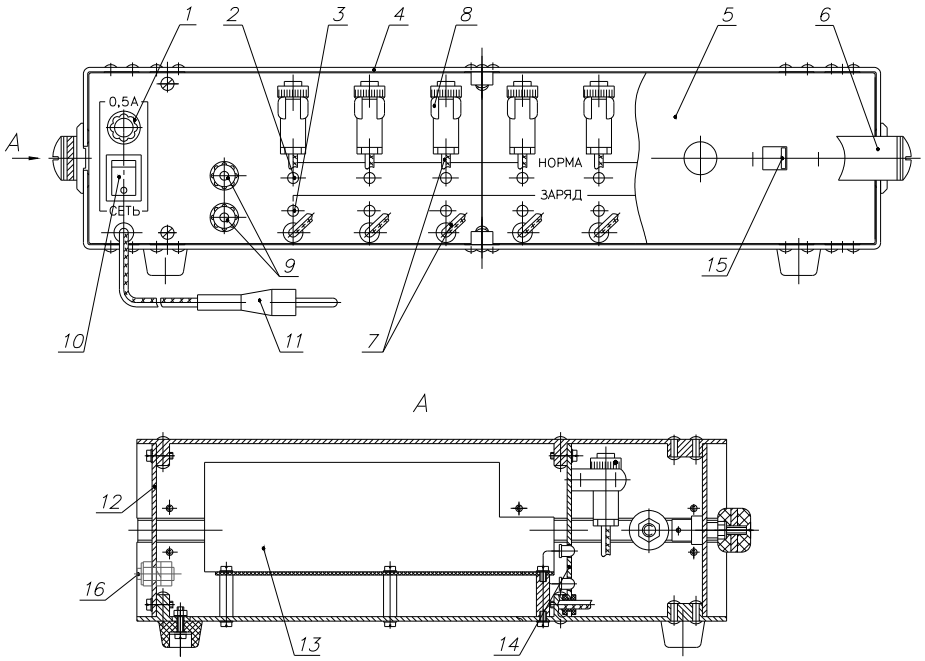
Fig. 6.3

6.4.1 RC Rx can be used both as a stationary information acquisition board at a guard station and as a portable one. In the second case RC Rx is placed in a bag 14. Storage battery 12 is placed inside case 1. To control indicators and to handle RC Rx controls there is a window in the bag which is closed with a valve to prevent random pressing control buttons when an operator moves. On the side of the RC Rx case there is “POWER SUPPLY” switch 5 to switch on power supply, two plug-and-sockets 3 to connect to a charger, plug-and-socket 4 to connect to an external DADS and plug-and-socket 2 to connect antenna 15. A remote antenna is connected to the same plug-and-socket. On the front of the case there are indicators of alarm mode: digital 11 “# SECTOR”, “СБРОС” button 13 (RESET) and indicators and controls of automatic control 6, 7, 8 and power supply control 9, 10.

6.4.2 There is a sliding strap 16 in bag 14 for comfortable transport of RC Rx. Using this strap the bag can be carried on the shoulder or in a hand. There is pocket 17 for the antenna.

6.5 **Charger Construction (fig.6.4).**

6.5.1 C consists of case 4 covered with lids 5 and 12 from the front and from behind. Inside the case there is C plate 13. Under the front lid 5 opened with catches 15 there is a false panel 14. On this panel there are control means (“НОРМА” indicator 2 (norm) and “ЗАРЯД” indicator 3 (charge), connection means (SB charge cables 7, mains cord 11), controls (“СЕТЬ” toggle switch 10), and an electric fuse holder 1 with electric fuse. Space is provided between the front lid 5 and false panel 14. It is necessary to fix cables 7 and a mains cord while transporting. While transporting a plug of mains cord 11 is placed into sockets 9; plug sockets of accumulator charge cables 7 are placed into corresponding clamps 8. For comfortable transport there is sliding handle 6. On the back lid 12 there is bonding point 16.



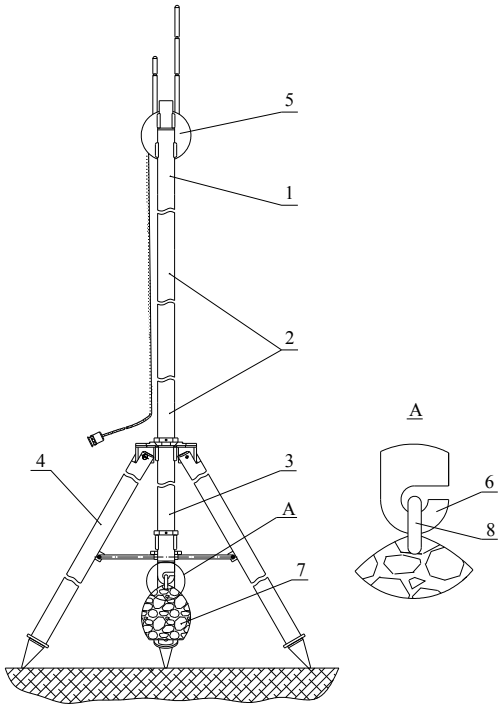
1 – electric fuse holder	- 1 item;	9 – socket	- 2 items;
2 – “НОРМА” indicator 2 (norm)	- 8 items;	10 – “СЕТЬ” toggle switch (mains toggle switch)	-1 item;
3 – “ЗАРЯД” indicator 3 (charge)	- 8 items;	11 –mains cord	- 1 item;
4 – case	- 1 item;	12 – back lid	- 1 item;
5 – front lid	- 1 item;	13 – charger plate	- 1 item;
6 – handle	- 1 item;	14 – false panel	- 1 item;
7 – accumulator charge cable	- 8 items;	15 – catch	- 2 items;
8 – clamp	- 8 items;	16 – bonding point	- 1 item;

Fig. 6.4

6.6 **Remote Antenna Construction (fig. 6.5).**

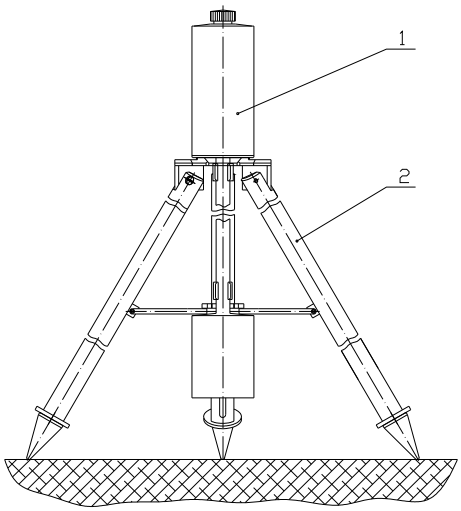
6.6.1 A remote antenna consists of:

- pole 4 (any pole of the system is used);
- concatenated elbows (upper one 1, two central 2 and lower 3);
- antenna 5 fixed to upper elbow 1;
- bag-counterweight 7 to be filled at the place of the system operation and fixed on hook 6 with a metal ring 8.



1 – upper elbow	-1item;	5 – antenna	-1item;
2 – central elbow	-2 items;	6 – hook	-1item;
3 – lower elbow	-1item;	7 – bag-counterweight	-1item;
4 – pole	-1item;	8 – metal ring	-1item;

Fig. 6.5



1 – Rx (Tx)	- 1item;
2 – pole	- 1item.

Fig. 6.6

7 SAFETY MEASURES

7.1 “Rules of technical operation of consumers’ electrical facilities” and “Rules of safety of consumers’ electrical facilities” should be observed while installation and repair of the system.

7.2 Technicians are allowed to install, maintain and repair the system after they learn special instructions and pass exam related to safety measures during the work with electrical equipment up to 1000 V voltage.

7.3 Maximum value of average flux of SHF energy at the distance 1 m from the system transmitter does not exceed 1mcW/cm^2 , that meets safety regulations for technicians who do not work with SHF.

7.4 Power supply of the charger is carried out from 220 V mains. Before one starts working it is necessary to read the charger description and rules specified in sections 5.3, 6.5 and 10.2. Safety device must be replaced only when the charger is OFF the 220V mains.

8 MOUNTING

8.1 Requirements to the Sector Landform and Application Conditions

Surface landform where the system sector is mounted must meet the following requirements:

a) maximum height of the sector surface irregularities is $\pm$0,3m, height difference within the sector is 3 m maximum;

b) in the sector there must not be moving gate wings, bushes, trees and etc. at the distance of 4m from the axis connecting Tx and Rx. There can be single immovable objects which do not prevent direct vision between Tx and Rx; single trees and bushes with sparse leaves;

c) maximum height of grass must be 0,3m;

d) maximum height of snow must be 0,5m;

e) along the sector axis there must not be fences, walls and other objects at the distance less than 20m;

f) if Tx and Rx are covered with ice the system operation can be unstable (false alarms and etc.);

g) transport circulation at the distance less than 20m from the sector axis is prohibited.

8.1.1 Additional recommendations on the system sector arrangement:

1) if the grass height is less than 0,5 m the maximum sector length is 35 m, if the grass height is less than 0,7 m the maximum sector length is 12-20 m.

2) if there are surface irregularities more than 0,3 m or height difference more than 3m it is recommended to reduce the sector length to 40m and less (depending on the landform).

3) if there are extended vertical surfaces (wall, fence, a group of trees or bushes) located along the sector axis, recommended length of these sectors is 20-25m maximum.

4) if sectors are located at the distance less than 20 m along the route where heavy hauler can circulate, the sector length should be reduced up to 20-25m.

5) if the height of snow cover is over 0,5 m and where poles varnish in the snow during the installation it is necessary to press snow at the place where a pole is installed and reduce sector length up to 35m.

6) if the system sector must be installed in bushes it is recommended to reduce the sector length up to 10-20m depending on the bush thickness.

8.2 Pole Mounting

8.2.1 Take a pole out the bag and mount it according to fig. 6.2. On the slopes adjust the vertical position of the pole adjusting the length of sliding bar 3 at the loosen screw 6. Press the sharp legs of the bar into the ground. After the pole is mounted, distance bars 5 must be in "stretching" position.

8.3 Mounting & Supply Switching-On of Tx (Rx)

8.3.1 Take Tx (Rx) out the rucksack and fix it on the pole (see fig. 6.6) snapping tube 8 (see fig. 6.1) into springs 1 (see fig. 6.2) of the pole.

8.3.2 To switch on power supply of Tx (Rx) lower it **smoothly** up to the stop, keep distance-bars 5 with a hand preventing their removal downward. Platform 2 of the pole (see fig.6.2) press power supply button 11 (see fig. 6.1) of Tx (Rx).

IT IS PROHIBITED to lower Rx (Tx) jerkily and with effort to prevent power supply button failure.

8.4 Rx (Tx) Positioning

8.4.1 To form a sector detection zone it is necessary to position the Rx mark (pointer) and the Tx mark (pointer) so that they are on one straight line which is the detection zone axis. The positioning accuracy of the marks and pointers ia $\pm 10^{o}$.

8.4.2 The mark is positioned with the Tx (Rx) turn around its axis; the pointer is positioned turning Tx (Rx) handle.

8.4.3 For the outer Tx one mark (or pointer) should be positioned to the corresponding mark of sector Rx, and the other should be positioned to the opposite direction.

ATTENTION! The sector is formed either with the marks or the pointers.

The example of the correct positioning is given in fig.8.1.

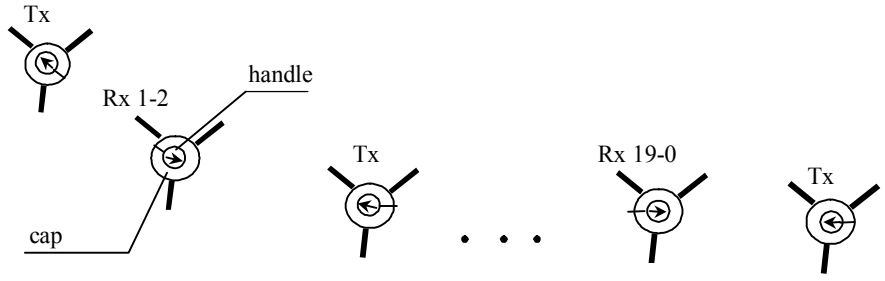


Fig. 8.1

8.5 RC Rx & Remote Antenna Installation

8.5.1 Place the RC Rx at the guard station. If several RC Rxs are placed at the guard station, they must not be installed at the distance less than 2-3m from each other because it can cause the reduction of the reception range.

8.5.2 If the distance between Rc Rx and a protective sector does not exceed 200 m, use a spike antenna from the RC Rx set (see fig. 6.3). Take the antenna out the bag pocket and connect it to "АНТЕННА" plug-and-socket (antenna plug-and-socket).

8.5.3 The installation place of RC Rx with a spike antenna should be chosen experimentally in order to provide reliable receipt of alarms from all protective sectors of the system. RC Rx should be placed vertically with the antenna upwards, at the maximum distance from the wiring lines and heavy metal objects (lock boxes, shelves, heating pipes, grids, etc.), and at the distance 0,5 m minimum from reinforced-concrete ceiling floor or wall.

8.5.4 Open the side hole of the bag and set the switch "ПИТАНИЕ" (supply switch) to "ВКЛ" position ("ON" position). If all the system sectors are in standby mode, an audio signal is ON and "-" sign is shown on the digital display.

8.5.5 Fasten the side hole. RC Rx is ready for operation both in stationary and portable variants.

8.5.6 If the distance from RC Rx to the protective sector is over 200 m , use a remote antenna, the length of the antenna cable is 6m.

8.5.7 Mount the remote antenna in the following way:

- mount antenna 5 on upper elbow 1 (see fig. 6.5);
- connect upper elbow with two central elbows 2, then with lower elbow 3;
- mount this mast on pole 4, fix it using a hook on lower elbow 3;
- hang bag-counterweight 7 on hook 6, previously fill it with heavy objects (stones, sand, metal details, etc,). Its weight must be 5 kg minimum. The bag is hanged with metal ring 8.

8.5.8 RC Rx is not recommended to be mounted near, inside and on large metal constructions, nearer than 1 – 3 m from power lines, metal tubes, radio noise sources.

8.6 Connection of RC Rx to the Charger

8.6.1 Connect a socket of a cable of accumulator charge of any charger channel to one of the RC Rx "ЗАРЯД БАТАРЕИ" (battery charge) plug-and-sockets to use a charger as a stationary power supply source of RC Rx. "ПИТАНИЕ" (power supply) switch of RC Rx must be in "ВКЛ" position ("ON" position).

Attention! If it is necessary to switch off a charger, first disconnect RC Rx from a charger to prevent RC Rx accumulator discharge via a charger.

8.7 Connection of RC Rx to DADS

8.7.1 RC Rx is connected to DADS via "ВЫХОД НА ССОИ" (OUTPUT TO DADS) plug-and-socket of RC Rx using a system DADS cable. The purpose of "ВЫХОД НА ССОИ" (OUTPUT TO DADS) plug-and-socket studs are given in table 8.1.

Table 8.1

# stud	Marking of the cable wire	Signal
6	"ТР"	Generalized alarm (a sector number is not indicated)
7	"ТР"	
3	"АК КРБ"	Generalized functional report (AC and BDC reports)
5	"АК КРБ"	

8.8 Sectors Setting to Standby Mode

8.8.1 Sectors are set to standby mode automatically after the expiry of Rx damping time after power supply is ON.

The period of Rx damping time depends on the order of power-up of Rx and Tx of the sector.

If first Tx is switched on and then Rx is ON, the damping time does not exceed the time of lockout of alarms generated by Rx. The damping time is 30 sec.

Otherwise, the damping time is counted from the time of Tx switching-on and it lasts 4 mminutes maximum. After Rx lockout time is over (30 sec. from the moment of power-up) it generates alarms till damping.

8.9 Sector Setting to "Automatic Control" Mode

8.9.1 Sectors are set to "Automatic Control" mode in pairs: 1-2, 3-4 and etc. The procedure of sector setting to "Automatic Control" mode is considered for sectors 1-2 as an example.

8.9.2 Press "1-2" button on RC Rx. After that the LED corresponding to this button starts interrupted glowing (radio signals "Automatic control" from Rx 1-2). After signals are received the LED starts continuous glowing (indication of "Automatic control" mode of 1 and 2 sectors).

8.9.3 Press "1-2" button during the LED continuous glowing to reset "Automatic control" mode of 1 and 2 sectors. After that the LED becomes dim.

ATTENTION! To save the charge of RC Rx storage battery, indicators of sectors set to "Automatic control" mode become dim in 4-6 sec. after sectors are set to this mode.

8.9.4 Press any of the keys "1-2" …"19-20" to control "Automatic control" mode of the sectors; after that the LEDs of the sectors set to "Automatic control" mode are ON for 4-6 sec.

9 SYSTEM DEPLOYMENT

9.1 Draw up the draft of a protective sector. Divide it into sectors 50m long maximum.

9.2 Choosing the place of pole installation take into account the following things:

- if possible place poles on higher points, not in the cavities;
- in those places where perimeter line turns, try to make the length of adjacent sectors approximately equal;
- in turns the obtuse angle is more preferable than the right or acute angle;

The examples of the right and wrong arrangement of the poles are given in fig. 9.1.

RIGHT WRONG

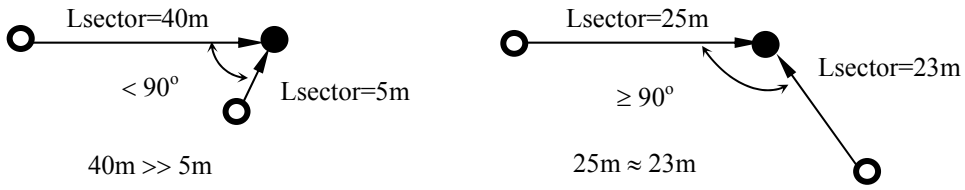


Fig. 9.1

9.3 When deploying the system the following procedures are fulfilled at the same time:

- poles are installed according to procedure 8.2;
- Tx (Rx) power supply is set and switched on according to procedure 8.3;
- Rx (Tx) is positioned according to procedure 8.4;
- sectors are set to standby mode and their operability is checked according to procedure 8.8;
- sectors are set to "Automatic control" mode according to procedure 8.9.

9.4 Sectors are deployed in pairs; both sectors of this pair are supported by one Rx.

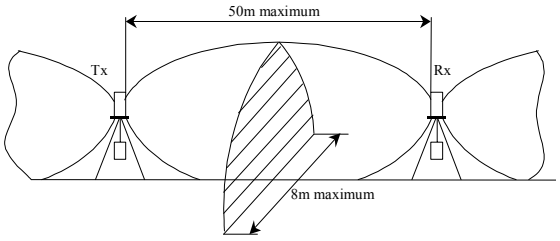
9.5 Sectors are deployed by three people. One person takes RC Rx with him; hereinafter this person is referred to as an operator.

9.6 The procedure of deployment is given dered in fig. 5.1 for sector 1 and sector 2.

9.7 Arrange three poles of sectors 1 and 2 according to the draft of a protective sector. Mount two Txs and Rx1-2 (they are mounted by an operator), position them and switch on Tx power supply. Switch on RC Rx power supply (a spike antenna must be mounted on RC Rx).

Switch on Rx 1-2 power supply, reset check alarms (see item 5.1.13), and after 30 sec. is over (damping time) check the sector setting to standby mode. The operator must be at the distance 2 m minimum from Rx1-2and he as well as the rest technicians must not be in the detection zones of deployed sectors. Configuration and size of a detection zone of each sector of the system are given in fig. 9.2.

Note. *If first Rx power supply is ON, then Tx power supply is ON, the damping time lasts up to 4 minutes (see item 8.8.1), after that reset all alarms including two check ones.*



If the sector length is reduced the detection zone becomes narrower.

Fig. 9.2

9.8 Set sectors 1 and 2 in "Automatic control" mode according to procedure 8.9.

9.9 Check the operability of sectors 1 and 2 by check passes in position "to one's full height" or "having bent"; the operator checks the indication of alarms on RC Rx. If the results are positive, the technicians start deploying two next sectors of a protective boundary.

9.10 During deploying or when after all sectors of the boundary are deployed it is necessary to mark sectors numbers on the draft. **Sector number corresponds to the number of the mark or pointer of Tx of this sector.**

9.11 When the operator comes to the guard station, it is necessary to check the status of all deployed sectors. Check that there are not alarms (see item 5.1.8) and AC reports (see item 5.1.10).

9.12 If there are AC reports from one or several sectors testify that signals do not pass over a radio channel. In this case try to find in the room of guard station the place of RC Rx installation according to item 8.5.3. If it is impossible, install the remote antenna according to procedure given in item 8.5. Disconnect a spike antenna and connect a remote antenna to RC Rx "АНТЕННА" (ANTENNA) plug-and-socket. After that check the setting of all deployed sectors to "Automatic Control" mode.

Note.

1 *If AC reports are not reset, then after a remote antenna is connected, sectors (including those which generate AC reports) are set to "Automatic Control" mode automatically. If AC reports are reset, these sectors are set to "Automatic Control" mode again, because when AC reports are reset, the sector automatic control is OFF.*

2 *A remote antenna is recommended to install at that place where the distance between a protective boundary and the guard station is over 200m and if a guard station is inside reinforced concrete buildings.*

10 SYSTEM OPERATION

10.1 Operation Procedure

10.1.1 The system operates in automatic mode within SB continuous operation time mode specified in item 3.12.

10.1.2 Control the system operability periodically (at least once a day) using check passes along each of deployed sectors.

10.1.3 The system is dislocated in arbitrary order. Rx and Tx power supply is OFF automatically when they are removed from the poles. Set "ПИТАНИЕ" switch ("POWER SUPPLY" switch) to "0" position to switch off RC Rx power supply. Pack the system components into bags and rucksacks according to the instructions given in item "Complete Set" 4372-43071246-007 ПС.

10.1.4 After the system is dislocated, charge SB of all Rxs, Txs and RC Rxs of the system including those which did not operate. Record the date of SB charge in item "Special Notes" 4373-43071246-007 ПС.

ATTENTION! Storage of charged SB decreases their service life.

10.2 SB Charge Procedure

10.2.1 Shift two catches 15 (see fig.6.4) to the centre and remove the charger front cover.

10.2.2 Check the integrity and accuracy of a mains cord and mains plug visually. Earth a charger using a bonding point. Connect a mains plug to 220V mains socket. Switch on a charger by setting "СЕТЬ" switch ("MAINS" switch) to "1" position. 8 LEDs "НОРМА" ("NORM" LEDs) must be ON.

10.2.3 Connect a cable of any channel of the charger to the plug-and-socket on its storage battery compartment to charge a Tx (Rx) storage battery. Simultaneously connect two channels of a charger to two plug-and-sockets “ЗАРЯД БАТАРЕИ” (“BATTERY CHARGE”) of RC Rx to charge a RC Rx storage battery.

If after the units is connected, “ЗАРЯД ” LED (“CHARGE” LED) is ON, then the unit storage battery is discharged and its charge is less than 85% of rated capacity. In this case the charge time is equal to the period of time from the moment of connection to the moment when “ЗАРЯД ” LED becomes dim of this channel and plus 2-3 hours.

If “ЗАРЯД” LED (“CHARGE” LED) of this channel is not ON while connecting the unit, the minimum charge time of this storage battery must be 2 hours.

Notes

1 *It is possible to enlarge the charge time, it does not cause SB overcharge.*

2 The charge time of discharged SB to the moment when “ЗАРЯД” LED becomes dim is 9 hours maximum (given as a reference).

3 Intensity of “НОРМА” LED (“NORM” LED) glowing can decrease after SB is connected. This decrease is defined by the SB discharge degree.

10.2.4 When charging is over, disconnect charger cables from the units and insert cable sockets into the corresponding clamps. Set “СЕТЬ” switch to “0”. Disconnect a mains plug from the mains and insert it into the special socket on the false panel.

10.2.5 Place the front cover, put cables under it, fix the cover with the catches shifting them to the centre.

IT IS PROHIBITTED to go on SB charging if after its connection “НОРМА” LED is OFF and it is not ON after 10 minutes of charging.

IT IS PROHIBITTED to keep batteries connected to charger channels after the charger is OFF because the batteries discharge via the charger input circuits.

11 MAINTENANCE

11.1 General Instructions

11.1.1 The system is maintained according to the schedule-prevention system which provides the following interval of routine maintenance:

- maintenance after use;
- semi-annual maintenance.

11.1.2 The system maintenance is carried out by the consumer’s technicians.

11.2 Maintenance Procedure

11.2.1 Maintenance after use includes:

- check of external view of the system components
- SB charging of the system units.

11.2.2 Semi-annual maintenance includes:

- monitoring of the charger external cables status;
- lubrication of the pole rubbing elements.

11.2.3 Check that there is not dust, dirt, snow and ice on the units. Dry the system components if necessary. Take them out bags and rucksacks; remove dust and dirt from the external surfaces of the Tx (Rx) with soft cloth. **Mechanical impacts on the unit surfaces are not allowed**. Remove dust from the external surfaces of the charger with soft cloth. The charger must be OFF and disconnected from the mains.

ATTENTION! Dirt on the side faces of Tx (Rx) upper cylinder reduces the system detection probability.

11.2.4 The system unit storage batteries are charged according to item 10.2.

11.2.5 The charger external cables state is monitored visually. Pay attention to the integrity and technical accuracy of the mains cord and cables of the channels.

11.2.6 Lubricate rubbing surfaces and axes of the following pole details with gun lubrication (see fig. 6.2): platforms 2, bars 4, sliding bar 3, distance bars 5.

11.3 **SB Replacement in Tx (Rx)**

11.3.1 SB must be replaced if:

– for Rx and RC Rx – if any Rx generates BDC reports systematically and if any RC Rx generates “RC Rx BDC” reports systematically before the period of continuous operation is over (see item 3.12);

– for Tx – if any Tx fails, i.e. alarms are generated when nobody enters detection zones of the sectors. Tx generates short audio signals.

11.3.2 SB is replaced in the following way:

- remove bottom (position 1) (see fig. 6.1)
- takeout SB (position 2)
- disconnect conductors of the cord from SB clamps
- connect contacts to the new SB (red “+”, white “-“), put SB in to the storage battery compartment. The conductors must not be under SB. Put the bottom and fix it with screws. Charge a new SB.

IT IS PROHIBITTED to use Rx, Tx and RC Rx without storage batteries and to connect them to a charger. It causes their failure.

Note.

1 Storage batteries COSLIGHT 3-GFM-4,0 or CSB GP 645 (Tx, Rx; 3-GFM-10,0 or CSB GP 6120 (RC Rx) *are used in the system units.*

2 The warranty does not cover storage batteries.

12 TROUBLESHOOTING GUIDE

List of possible troubles is given in table 12.1

Table 12.1

Trouble	Possible Cause	Action
1. RC Rx constantly generates alarms.	1. Tx and Rx positioning is disturbed. 2. Tx SB is discharged. 4. The sector length is too long.	Position Rx and Tx of the sector. Charge SB Decrease sector length.
2. False alarms.	1. Moving branches are in a detection zone and they cause alarms. 2. High grass in the sector. 3. Snow blanket is higher than one specified in the manual. 4. Animals circulate in the sector. 5. Vehicle circulation along the sector.	Inspect the sector and remove interference factors.
3. When a person crosses a detection zone, alarms are generated.	1. The sector does not meet requirements of item 8.1. 2. Rx receives a signal from "foreign" Tx.	The sector must meet requirements of item 8.1. Change configuration of the sectors.
4. Tx generates short audio signals.	1. Tx SB is discharged. 2. SB fails.	Charge SB. Replace SB.
When a charger is switched on, "HOPMA" LEDs (NORM LEDs) are not ON.	1. Protective device blows.	1.Replace a protective device.
When a charger is switched on, one of "HOPMA" LEDs (NORM LEDs) is not ON.	1. Short circuit on the socket contacts or short circuit in SBD charging cable. 2. The channel is out of order.	1. Eliminate short circuit. 2. Do not use this channel.

13 STORAGE

13.1 The system in the transport package can be stored indoors. The indoor temperature must be -50…+50ºC. Relative humidity must be up to 95% if there are not hostile agents in the environment.

13.2 Warranty storage period is 12 months maximum. During this period it is necessary to charge storage batteries of Tx, Rx and RC Rx from the charger periodically (in three months) according to the technique specified in section 10.2. . Mark the date of charging on each packing-case and in 4372-43071246-007 ПС (the certificate) (page 2).

14 TRANSPORT

14.1 The system can be transported in the transport container by any transport means (by plane – in hermetically sealed compartments) if it is transported in covered cars, holds or by cargo vehicles in covered bodies at the distance up to 500 km at the speed up to 40 km/hr.

14.2 A transport container must be fixed in order to prevent its displacement and impacts with each other.

14.3 The system can be transported at the ambient temperature ±50ºC. If the system is transported at the temperature below zero, it must be unpacked after its being in standard climatic conditions for 6 hours minimum.

14.5 The system can be transported in the consumer package by cars at the distance 100 km maximum.