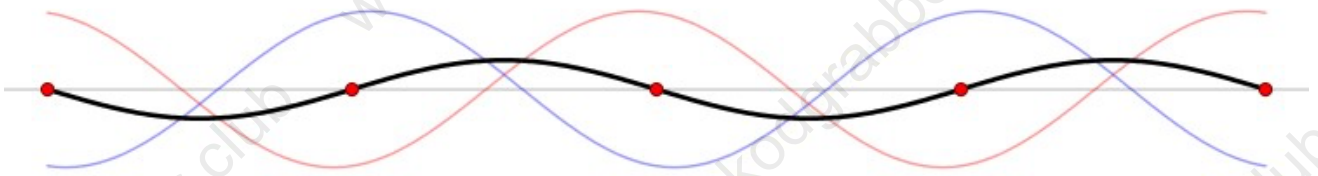


System "WAVE-LS 3D"

Version 8.2



1. Purpose

This device is intended for special police departments and other intelligence services that require discreet entry into a car for various purposes. The "WAVE-LS" system works with cars that have a standard "KEYLESS GO" or "KEYLESS ENTRY" comfort access system installed; the system also allows you to start the car's engine.

Attention!!!

The device is not intended to perform illegal actions!

2. Supported model range (for version 8.2) by switches

Modules* (switches)	Model range and approximate years of production
1	BMW E-series 1, 3, 5, 6, 7, X1, X5(M), X6(M), M3, M5, M6 for European and American market, all years.
1 2	BMW F-Series (including 2014 model year) 1, 3, 5, 6, 7, GT, M1, M3, M5, M6, X3, X5 for the Russian and European markets.
1 7	MERCEDES W221 since 2006 and ML (W164) and GL (X164) before 2012 onwards, C216 (CL) since 2006 for the European and American market
1 2 7	MERCEDES ML (W166) and GL (X166) With 2012 to 9.2013 (up to FBS4) for the European and American market
1 2 3 7	MERCEDES W222, ML (W164) and GL (X166) from 9.2013 (FBS4) GLE GLM for the European market MERCEDES C-KLASS, E-KLASS up to 21 years old.
2	NISSAN With 2009+ for European and American markets INFINITI With 2009+ for European and American markets
3	NISSAN PATROL/INFINITI QX56, QX80 for the European market
2 7	AUDI Q7 (being tested)
2 3 7	AUDI since 2009 everything (?) except Q7
3 7	PORSCHE CAYENNE 958, MACAN, PANAMERA, 911 only for the European market
4	TOYOTA LC200 before 2015, RAV4 before 2013 HIGHLANDER II, AURIS, PRIUS For European and American markets LEXUS LX570, IS, ES and etc. for the European and American markets SUBARU OUTBACK, FORESTER, TRIBECA before 2012, etc. for European and American market
4 5	HIGHLANDER III, TOYOTA CAMRY (2012+), RAV4 (2013+), GT86 (2012+), PRADO 2015+ only for the European market LEXUS RX 2014+ GS350 And GS450 only for the European market SUBARU BRZ and others With 2012 for the European market
4 7	TOYOTA LC200 and new LEXUS LX570, CAMRY 2017+ for European market 2015-2021
5	TOYOTA PRADO from 2010 to 2014 and LEXUS RX before 2014 only for the European market
6	RANGE ROVER/LAND ROVER/JAGUAR (including 2016-2017 model year) only for the European market

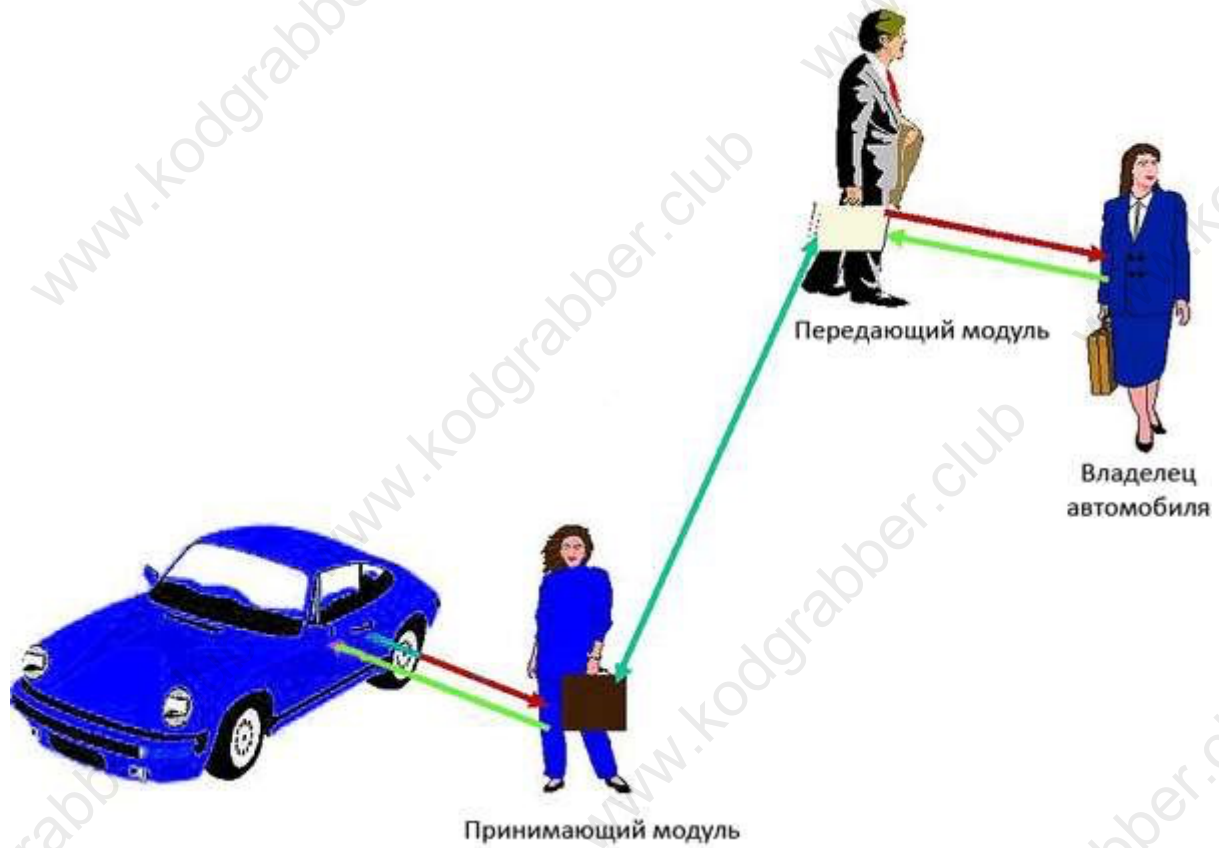
1 2 3	"DIRECT MODE 1" for all cars with 125 kHz BMW, HYUNDA , KIA, RANGE ROVER, TESLA, FORD ETC (except TOYOTA, LEXUS, SUBARU, MERCEDES from 2010 and AUDI) 2003-2024
1 2 3 4	"DIRECT MODE 2" for cars MERCEDES and AUDI from 2010 to 2024
4 7 8	"DIRECT MODE 3" for TOYOTA LEXUS SUBARU 2006-2024

3. Device characteristics

- Dimensions: 28 cm x 20 cm x 4 cm
- Battery life in standby mode up to 10 hours.
- Battery charging time 8-10 hours.
- Weight of repeaters – according to 0.5 kg.
- Dynamic radio spectrum extension system
- The devices use lithium-polymer batteries operating at high negative temperatures.
- The device will operate when the suppression system is turned on GSM 1000-1800 MHz

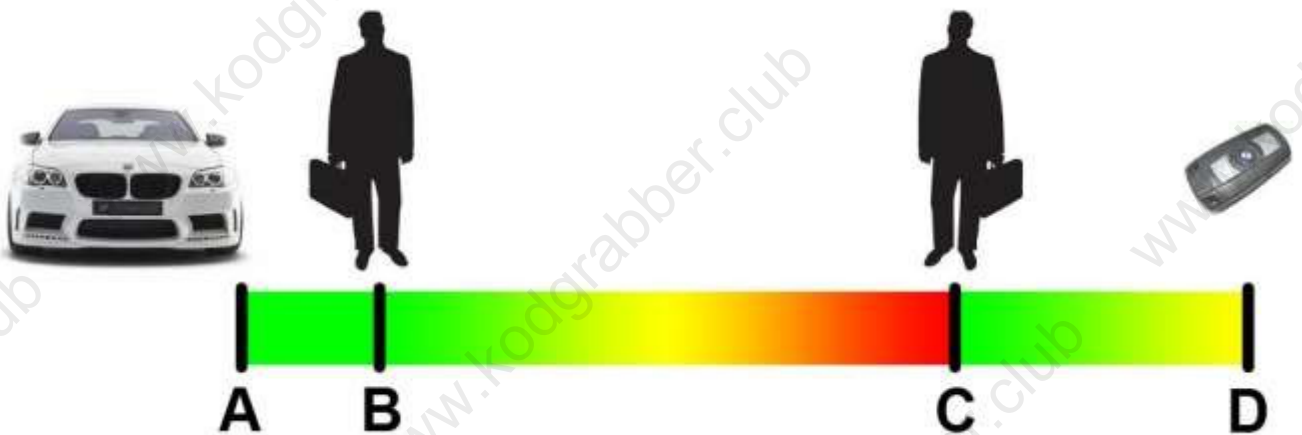
4. Principle and operating conditions of the system

The "WAVE-LS" system consists of two relay modules - receiving and transmitting. **Receiving module (sticker M - car)** must be located near the car, **transmitting (KL sticker - key, when turned on, flashes all LEDs 3 times)** at the key. After turning on the system, a high-speed digital data transmission channel is established between the modules, which allows you to relay vehicle requests to the key and back.



For the system to operate correctly, the following conditions **MUST** be met:

A. Working distances:



1. Distance **A-B** from the car door handle (the antenna is installed in it) to the receiving module (*repeater with M sticker*) must be at least 30 cm and no more than 70 cm.
2. Distance **B-C** between repeaters there must be at least 50 meters, otherwise the response signal from the key will overlap the signal from the repeater and the device will not work.
In the line of sight zone, the working distance between repeaters is up to 1 km. In city conditions, 500-700 meters.
3. Distance **C-D** between transmitting module (*repeater with sticker K*) and the key should be at least 1 meter and up to 9 meters.

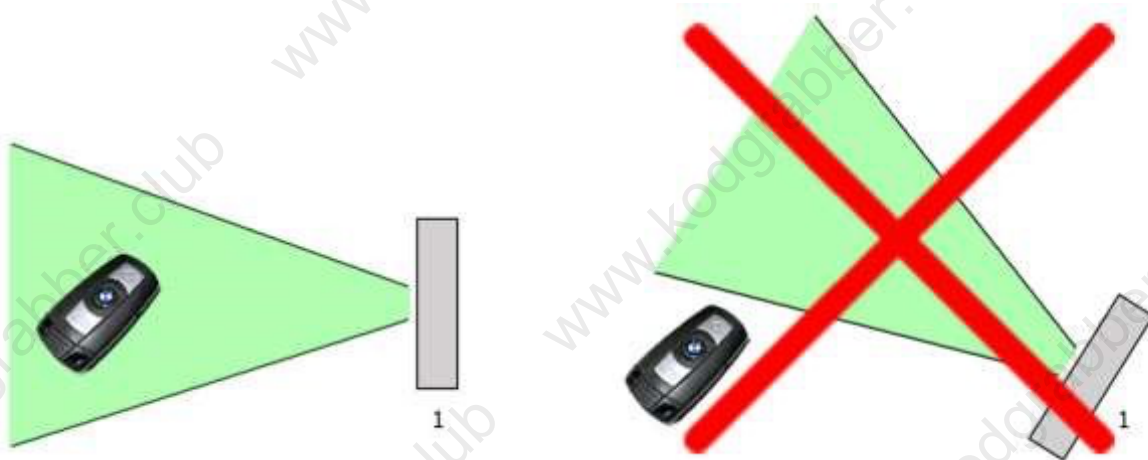
4. Using an external antenna can significantly increase the distance to the key. Example: TOYOTA LC200, a repeater with a connected external antenna will "see" the key, depending on interference and obstacles in the path of the radio signal, at a distance of 10 to 20 meters!

B. Position of repeaters:

1. The transmitting module must be aimed at the key. If the repeater faces away from the key, the reading range of the key may drop significantly and this will affect the quality of the system. See the picture below.

IMPORTANT!!!

Place the receiving module on the front passenger seat or on the console between the seats (this is the optimal place for good signal reception from the car's internal antennas)!



C. Critical distances:

If the system operates at a critical distance (poor connection between repeaters) and you did not manage to open the car the first time, then when you are inside, the metal body will create additional interference in the path of the radio signal, and there is a possibility that you will not be able to start the car, so how the connection between repeaters will be lost.

In this case, to restore communication, try lifting the repeater and bringing it to the windshield or side window **OR OPEN THE DOOR AND BRING THE REPEATER TO THE DOOR TO THE OPENING**, or wait until the second module gets closer.

Keep in mind!

If one of the repeater modules is located in a building, then due to poor transmission of the radio signal, the distance may drop significantly. Urban buildings, metal structures and strong urban radio noise also reduce the working distance between modules.

5. Control panel

The receiving and transmitting repeaters have identical control panels. Important!!! **BOTH REPEATERS MUST BE CONFIGURED THE SAME.**



1. Power on/off the device.
2. Indicator response from the key. Lights up green when the key responds to vehicle requests.
3. Indicator of communication between repeaters. Glows "yellow" when repeaters see each other.
4. Key request indicator. Flashes "red" when the car requests a key.
5. Operating mode indicator. Flashing slowly - battery saving mode, flashing quickly - working mode.
6. USB connector for updating repeater software.
7. Configuration switch for selecting operating mode. *BOTH RETRANSITORS MUST BE ARE COFIGURED THE SAME THING.*
8. Connection socket for charger (charger).

Switch	Module	Bank 2 (7 per)	America (8 per)	Purchased
1	BMW E-series	Off	On	
1+2	BMW F-series	Off	Europe	
2	NISSAN/INFINITI	Off	On	
3	NISSAN PATROL/INFINITI QX56 QX86	Off	On	
4	TOYOTA/LEXUS/SUBARU	Off	On	
5	PRADO/RX	Off	On	
4+5	TOYOTA/SUBARU	Off		
6	RR/LR/JAGUAR	Off		

Switch	Module	Bank 2 (7 per)	America (8 per)	Purchased
123	Cars EXCEPT TOYOTA, LEXUS, SUBARU, MB from 2010 and AUDI	Off		
1234	MERCEDES (from 2010 to 2024) and AUDI	Off		

Switch	Module	Bank 2 (7 per)	America (8 per)	Purchased
1	MERCEDES	On	On	
1+2	MERCEDES from 2011 to 2020	On		
1+2+3	MERCEDES from 9.2013 +	On		
2	AUDI Q7	On		
2+3	AUDI except Q7	On		
3	PORSCHE	On		
4	TOYOTA LC200 and LEXUS LX570 from 2015	On		

TURN THE SWITCHES CAREFULLY! DON'T PRESSURE ON THEM, DON'T PRESSURE TOO MUCH.

Note:

For the BMW F-series, the Russian frequency of 433 mHz is enabled by default, and switch 8 enables European purity.

Example: for working with Mercedes after 2011. – turn switches 1, 2 and 7 to the ON position. All other switches are turned off. If he is “American”, additionally turn on switch 8.

6. Work with BMW cars (E-series and F-series)

The car must be equipped with a standard comfort access system. This can be determined by the presence of “ribs” on the door handles as in the figure below. All BMW F-Series are equipped with a comfortable starting system INSIDE the car, there is a START button.



For BMW mode, configure the repeaters as follows:

- Both modules are turned off.
- Turn on the switch **number1** to position **ON (European market for E-series)**, all other configuration switches are turned off or **number1 and number 2 (Russian market for the F-series)**.
- **ForFor the E-series, switch 8 turns on the AMERICA mode (315 mHz), for the F-series it turns on the EUROPE mode (868 mHz)**
- **Make sure both repeaters are configured identically.**
- Turn on the power to the modules. Each module will start blinking green LED
- When the repeaters establish communication with each other, the yellow light will begin to glow on each device Light-emitting diode [*]. This means that the devices “see” each other and are in touch. The green LED will flash slowly - the system is in power saving mode.
- Place the receiving module near the car and the transmitting module near the key.

- Make sure that the devices are connected, otherwise wait until the “yellow” LEDs will light up on both devices.
 - Grasp the car door handle, the Comfort Access system will activate and a key request was made [**]. You will see how the “red” LED on the repeater will begin to blink in time with the key requests. The system will enter operating mode and the “green” LED on the repeater will begin to blink quickly.
 - The car will open
 - Bring the repeater into the car, now you can start the engine.
 - To lock the car, touch the ribbed surface on the door handle.
 - **After you have started the car engine, turn off the receiving module (sticker M) to prevent critical battery discharge!**
- * - Due to the strong radiated power, repeaters will not be able to establish communication at close range (up to 5 meters).
- ** - In order to prevent battery discharge, after 16 minutes the car “falls asleep” and will not respond to attempts to open it using the Keyless Go system. You can “wake up” the car by turning the door key insert (on F-series cars you need to pull the door handle towards you)

7. NISSAN/INFINITY/GTR (except PATROL and QX56)



The system works ONLY with such keys!

The operating principle is identical to that of BMW. Set the switches to the following position:

- All switches are off, only No. 2 included.
- **For AMERICA mode, additionally enable 8 switch.**
- **Make sure both repeaters are configured identically.**
- **After you have started the car engine, turn off the receiving module!**

8. NISSAN PATROL/INFINITY QX56

The operating principle is identical to that of BMW. Set the switches to the following position:

- All switches are off, only No. 3 included.
- **For AMERICA mode, additionally enable 8 switch.**
- **Make sure both repeaters are configured identically.**

• *VERY IMPORTANT:*

Place the receiving module on the front passenger seat (this is the optimal place for good signal reception from the car's internal antennas)!

- **After you have started the car engine, turn off the receiving module!**

- **!!! INQX56 and Patrol keep the repeater in the front passenger seat!!!**

9. TOYOTA/LEXUS

Set the configuration switches to the following position:

- All switches are off, No. 4 included.
- **For AMERICA mode, additionally enable 8 switch.**
- **Make sure both repeaters are configured identically.**
- On the transmitting repeater (sticker K), the key search mode is automatically activated, if the repeater sees any key from TOYOTA/LEXUS/SUBARU, then a bright blue LED will glow on it.

• To open the door, touch the inside of the door handle.

• To close, press the black button on the door handle.

- **After you have started the car engine, turn off the receiving module!**

10. TOYOTA PRADO/RX (since 2010)

Set the configuration switches to the following position:

- All switches are off, No. 5 included.
- **Make sure both repeaters are configured identically.**
- On the transmitting repeater (sticker K), the key search mode is automatically activated, if the repeater sees any key from PRADO or RX, then a bright blue LED will glow on it.

• To open the door, touch the inside of the door handle.

• To close, touch the indentation on the door handle.

- **After you have started the car engine, turn off the receiving module!**

11. MERCEDES from 2011 to 9.2013 (W222 not supported)

Set the configuration switches to the following position:

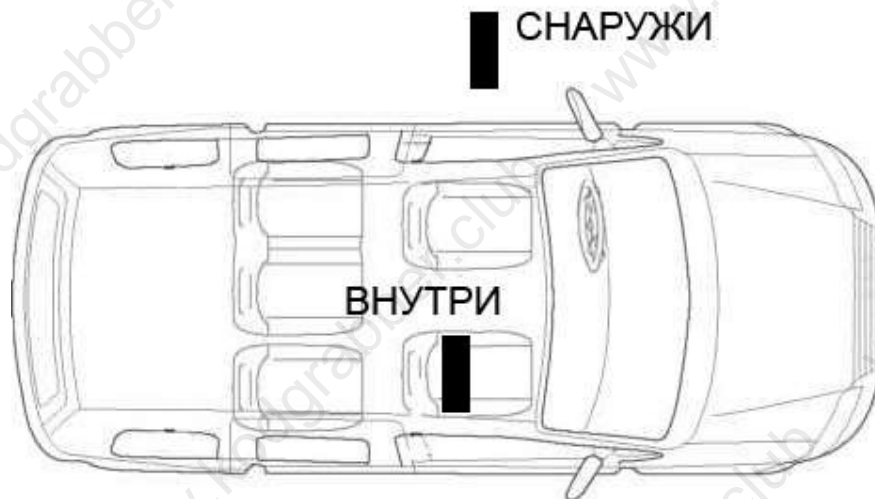
- All switches are off, No. 1, 2 and 7 are on. If the car's headlights have yellow turn signals, additionally turn on switch 8 (America mode).

- **Make sure both repeaters are configured identically.**

• Hold the repeater 30-40 cm from the door handle PERPENDICULAR to the driver's door (*other doors may not work*)

• Inside, it is better to place the repeater on the front passenger seat, there is the optimal place for good reception of the internal antennas.

- *Important: Make sure that the Repeater does not "catch" interference from the car's electronics; the red indicator should not blink constantly. On the outside, the red indicator should react only when you touch the handle of the car, on the inside only when you press the START button!*



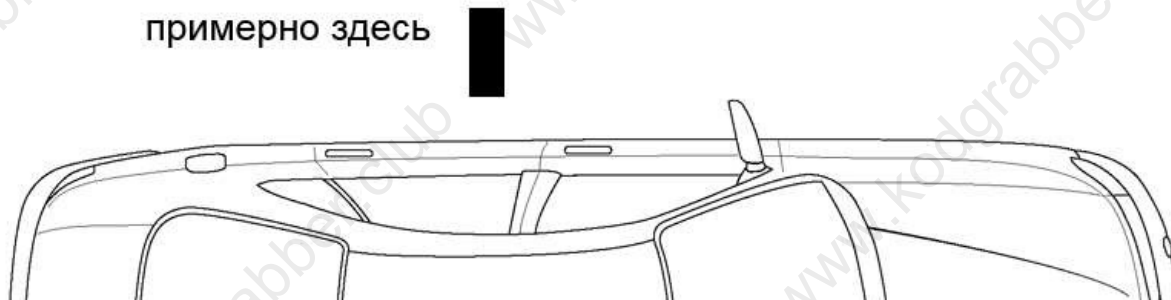
- To lock the car, touch the outside of the door handle.
- **After you have started the car engine, turn off the receiving module!**

12. AUDI (except Q7)

Set the configuration switches to the following position:

- All switches are off, No. 2 and 7 included.
- **Make sure both repeaters are configured identically.**
- *IMPORTANT!!! Hold the repeater between the left side door handles (see illustration) (When The system will not work correctly in any other location of the module!!!)*

примерно здесь

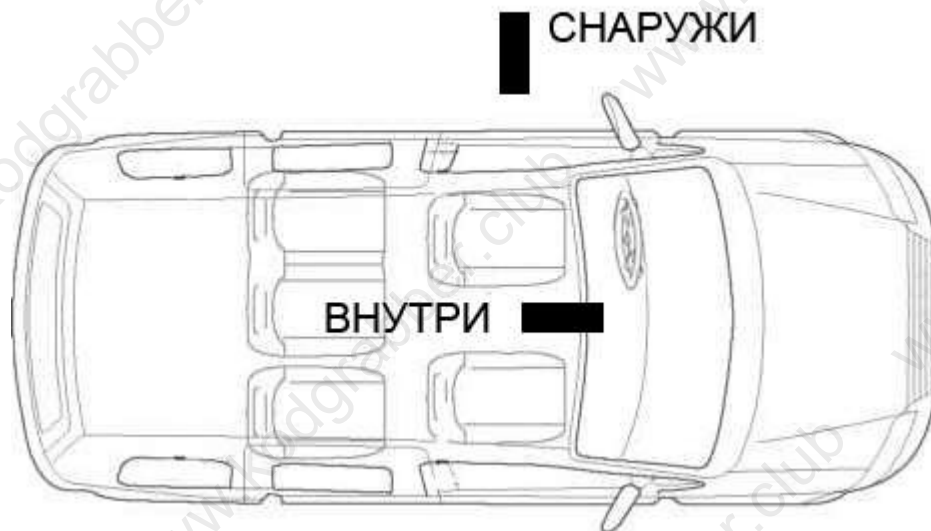


- Inside, the repeater should be located on the glove box between the front seats, there is the optimal place for good reception of internal antennas.
- To lock the car, touch the square on the door handle.
- **After you have started the car engine, turn off the receiving module!**

13. JLR (JAGUAR/RANGE ROVER/LAND ROVER)

Set the configuration switches to the following position:

- All switches are off, No. 6 is on.
- **Make sure both repeaters are configured identically.**
- Hold the repeater PERPENDICULAR to the middle of the driver's door.
- Inside, it is better to place the repeater on the front console of the car, there is the optimal place for good reception of the internal antennas.
- *Important: Make sure that the Repeater does not "catch" interference from the car's electronics; the red indicator should not blink constantly. On the outside, the red indicator should react only when you touch the handle of the car, on the inside only when you press the START button!*



- To lock the car, press the button on the door handle.
- **After you have started the car engine, turn off the receiving module!**

Note:

In new JLR cars, if the START button inside does not work the first time, the car requires you to place the key on the steering column, in which case pressing the START button again is possible no earlier than 10 seconds after the last attempt!

14. Other cars

Working with other cars is similar to the procedures described above.

15. External antenna (only in combination with additional antennas)

YOU CAN ONLY DISCONNECT THE EXTERNAL ANTENNA WHEN THE REPEATER IS TURNED OFF!!!

The antenna marked in red (at the connector) is intended for all TOYOTA/LEXUS/SUBARU, including new ones. The second antenna has been reassigned to NISSAN/INFINITY. If you mix up the antennas, the range to the key will drop significantly.

In new versions of the device, only one universal antenna is supplied. To work with TOYOTA, wrap the wire from the tee to the mark around your palm and secure it with an elastic band (see photo). To work with NISSAN/INFINITY (and other car brands), the hinge must be fully open.



You can connect an antenna to the repeater when it is turned on, and the repeater will blink all LEDs twice and switch from the internal antenna to the external one. Connect the connector carefully, make sure that the guides on the plug match the connector, do not press hard on the connector.

Disconnect the external antenna only when the Repeater is turned off! To disconnect connector, press the black button on the plug, carefully remove the plug. Take care of your equipment!

Note: To get maximum results, straighten the antenna so that it takes a rectangular or square shape, sagging at the bottom is acceptable. It is advisable to keep the antenna suspended so that it does not touch the floor. If the car is close to the key, switch the M repeater to "America" mode.

16. Choosing a bag for carrying repeaters

The bag is good for carrying laptops. When purchasing a bag, make sure that it does not have a metal stiffener around the perimeter (this can be done with a magnet). It is advisable that the bag does not have metal fittings (zippers, belt loops, decorative elements).

Repeaters will not work in a bag with a metal stiffener!

17. Direct modes (switches 123 and 1234, 4 7 8)

These are universal modes for a large range of cars with the Comfort Access function. In these modes, the request from the car is forwarded only towards the key; the return signal from the key must "finish off" to the car! The operating radius in these modes depends on the state of the battery in the key, for example, BMW X6M - 40 meters, MB ML 2014 - 60 meters, TOYOTA LC200 - 30-60 meters.

PLEASE READ IMPORTANT NOTES:

- America mode can be turned on or off "hot" when running device without rebooting. When changing mode, the device will blink all LEDs.
- In mode TOYOTA/LEXUS/SUBARU (including new ones) has a key search feature. If the key is within the range of the transmitting module (Key sticker), the blue LED will light up. Binding to the car is not required; in this mode, the repeater "sees" all keys (depending on how the system is configured). Example; TOYOTA + America mode is selected - the module will "see" all keys from American TOYOTAs within the range of the device, and the Repeater will not respond to European keys and keys from new SMART 3 systems in this mode.
- On new cars, to protect against interference in radio signals, the keys "jump" in frequencies and this affects the operation of the system, you may need to duplicate your actions; Pull the door handle several times and press the engine start button several times.
- If the repeaters are low and the red battery charge indicator is constantly on, the system will not work. Do not forget to turn off the repeaters, and do not allow the batteries to be completely discharged - this will damage the batteries. Charge the battery completely, even if the indicator starts to glow green, wait until the full charge cycle is about 10 hours.
- Door handles on cars become "dead" due to winter chemicals. If the red indicator is not reacts to the touch of the door handle - it is disabled or faulty. Try other pens.