



POLICE RADAR GUN
"RADIS"

OPERATION MANUAL



SIMICON

SAINT-PETERSBURG

"SIMICON" Ltd.

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OPERATION MANUAL

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SAINT-PETERSBURG

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1. INTRODUCTION

This operation manual is intended for familiarization with "Radis" police radar guns and study of their operating rules. This operation manual spreads on all "Radis" police radar guns (RR-D-4, RR-DM-2) manufactured according to 6814-008-31002820-04 TU technical requirements

Before work, please study thoroughly this operation manual to master all functions and possibilities of the device. Prior to the device operation make sure there is no external damage and check the completeness of the device.



The most important warnings in the text are marked with this symbol. Please, be mindful of these warnings. Disregard of these notifications may result in damage of the equipment or health hazards.

Pictures and schemes in this manual serve as demonstration and acquaintance with the operation procedure and may differ from actually supplied devices and accessories.

On account of the continuous improvement work performed on the products, the items manufactured at various times may slightly differ from one another. Such modifications do not have any effect on metrological or operational performance of the device.

The manufacturer reserves the right to introduce improvements and/or changes to the devices and their configuration without special notice.

2. FUNCTION

The police radar gun is intended for usage by traffic police officers with the purpose of the traffic speed control on roads and streets.



Fig. 1. Appearance of the police radar gun with the handle

The police radar gun is a device with hand or automatic start of the measurement process. The police radar gun selects targets

according to the direction of their motion, singling out the fastest moving target in a traffic stream.

The police radar gun can be used both hand-held and being mounted on a patrol car (in its stationary position or in motion). In the latter case the patrol car speed is determined and indicated automatically in addition to that of the oncoming or co-direction target.

For operation handiness and information output there are two indicators on the police radar gun: LCD display and the bright light-emitting diode (LED) indicator. The police radar gun allows simultaneous saving of information concerning two targets having exceeded the speed limit.

Power supply of the police radar gun is provided by the lithium-ion battery, embedded into the power supply unit (see paragraph 5.2). Battery embedded into the handle could be recharged even during the police radar gun operation using car on-board power system.

The police radar gun could be fixed inside the patrol car using a special bracket.

3. SPECIFICATIONS

3.1. Basic technical data

Radiated operating frequency	24.15 ± 0.10GHz
Distance range of radar operation ¹⁾	not less than 400m
Range of measured speeds	10 to 300 km/h
Acceptable error margin:	
- in stationary mode	± 1 km/h
- in moving mode	± 2 km/h
Speed measurement time	not more than 0.3s
Singling out the fastest moving target in a traffic stream if the target's speed exceeds that of the others ²⁾	by 10 km/h or more, with the ratio of target radar echo to traffic radar echo not less than 1:10.
Digitization of speed threshold setting	1 km/h
Number of targets the information on which can be stored in memory	2
Time of information storage in memory cells	10 minutes
Transient period to operating mode after power-on	not more than 5 sec
Allowable duration of continuous operation	not less than 16 hours
Operation time from the battery ³⁾	not less than 8 hours

¹ This parameter does not mean limitation for measurement at distances less than 400m. It just emphasizes the possibility for the radar gun to operate at distances of 400m and more. More detailed information about the distance range setting see in paragraph 10.1.5 of the operation manual.

Also refer to paragraph 7.6 of the operation manual.

² According to the requirements set out in Technical Specification. Actually the radar gun provides singling out the fastest target at a speed limit excess of 3 km/h and the echo ratio 1:100.

³ For measurement frequency equal to once in a minute.

Power voltage of the police radar gun	10.0 to 16.0V
Weight, not more	
- Measuring unit	240g
- Measuring unit with handle and battery	450g
Overall dimensions of the radar gun with handle	155 x 150 x 61mm

3.2. Basic functions and possibilities

3.2.1. The police radar gun can operate in a hand or automatic mode. In an automatic operation mode there is a periodic radiation of a signal and the measured speed is displayed by indicators. When speed value exceeds the speed limit, the radiation is stopped and the target's speed will be automatically entered into memory, and a signal will be sounded.

3.2.2. The police radar gun allows simultaneous saving of information concerning two targets having exceeded the speed limit.

3.2.3. The police radar gun displays the timer readings on the LED indicator from the moment of the registered speed limit exceeding for both memory cells. LCD indicator displays the current time and the time point when exceeding of the established speed limit (also for both memory cells) has been registered.

3.2.4. It is possible to set three levels of sensitivity providing the speed measurement distance of 300, 500 and 800 meters correspondingly.

Accuracy of measurement is achieved regardless of the distance at which the measurements have been made.

3.2.5. The police radar gun provides selection of the target movement direction.

3.2.6. The police radar gun provides speed measurement of oncoming and out going vehicles while operating from a moving patrol car. Both the target's and the patrol car's speeds will be displayed alternately.

3.2.7. There is possibility of adjustment of the LED

indicators' brightness and the LCD display contrast and brightness, as well as the backlighting time for the LCD display. It is also possible to adjust volume of the sound signal.

3.2.8. The police radar gun can be used together with an external computer or video framing device (also from another manufacturers). The information of the current compatible video framing devices can be obtained from the manufacturer.

3.2.9. Power supply of the police radar gun is provided from a self-contained power unit. The police radar gun keeps a check on the battery level and gives the alarm signal when the voltage is reduced below a normal value. Battery embedded into the handle could be recharged even during the police radar gun operation using car on-board power system.

3.3. Basic operational characteristics

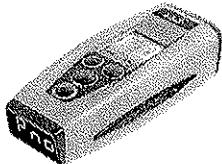
The radiated power flow density in the opposite direction at a distance of 0.5m and in a straight direction at a distance of 2m	not more than 10 $\mu\text{W}/\text{cm}^2$
The police radar gun maintains its operating characteristics under the following climatic conditions: - ambient temperature ⁵ - relative humidity - atmospheric pressure	- from -30 $^{\circ}\text{C}$ to +50 $^{\circ}\text{C}$ - up to 90% without a moisture condensation - from 60 to 106.7 kPa
Extreme conditions for transportation	according to 6 Group GOST 22261-94 (ICS 17.220.20)

⁵ With temperatures below -20 $^{\circ}\text{C}$, switching-off of the LCD display with preservation of indication on LED indicator is allowable.

Resistance to mechanical impacts	according to 5 Group GOST 22261-94 (ICS 17.220.20)
Immunity to radio-frequency electromagnetic fields	in accordance with GOST P 51317.4.3-99 (protection level III) (EN 61000-4-3-95)
Mean time to first failure (MTTF)	not less 6000 hours
Average service life (till discarding)	not less than 5 years

4. COMPONENTS OF THE POLICE RADAR GUN

The basic supply configuration of the radar gun includes:



1. Police radar gun 1 piece



2. Power supply unit (detachable handle) 1 piece



3. Cable for connection to the cigarette lighter socket 1 piece



4. Bag for transportation and storage	1 piece
5. Operation manual	1 copy
6. Logbook	1 copy

The list of basic supply given above may differ from the specific complete set. The accurate list of the supplied devices and accessories is provided in the logbook for the device (item "Delivery set").

The following accessories can be provided on request:

1. Attachment bracket (for attaching the police radar gun to windshield)
2. Power supply adapter for connection of battery charger to AC 220V mains.
3. Video framing device.

5. DESIGN AND OPERATION

5.1. Principle of operation

Operation principle of the police radar gun is based on the Doppler Effect involving a Doppler frequency shift of a radar signal during reflection from a moving object.

Doppler frequency shift is proportional to the object speed; therefore the speed measurement consists of the difference measurement between frequencies of the radiated signal and returned signal from the target.

Digital low-frequency signal's processing based on Fourier transformation is used for the spectrum analysis and for frequency value measurements.

The full spectrum analysis provides to single out the

fastest target speed against a background of the slower targets and to measure separately the patrol car speed and the target speed during movement.

Two independent channels are used for selection of targets by the direction of their movement. Measurement of the relative phase shift between the Doppler signals of two channels allows making the decision as to the target movement direction.

Output signals from two channels are entered in the calculating memory, where these signals are digitized, saved, and further processed to obtain information on the targets' speeds.

When receiving information about the measured speeds, the digital data is displayed on the LED indicator and on the LCD display.

After each measurement cycle the microwave oscillator is switched off, which allows to reduce consumed power of the police radar gun and to increase the noise immunity of the device.

The calculating memory card also provides the information distribution and storage in the memory cells, the speed limit setting, the measurement of time elapsed from the speed limit being exceeded, and its indication. Furthermore, the calculating memory card provides the radar operating mode setting and performs a number of service functions, including monitoring of the power source condition.

5.2. Police radar gun design

The instrument is encased in a shockproof plastic case. The front and rear parts of the instrument are safeguarded by elastic rubber protectors. A dielectric lens of the transceiver antenna is mounted in the front part of the casing ([1] Fig. 2).

A microwave unit consisting of the oscillator, mixers, waveguide channel and horn antenna is installed in the case of the police radar gun. A plate of amplifiers is mounted on the microwave unit.

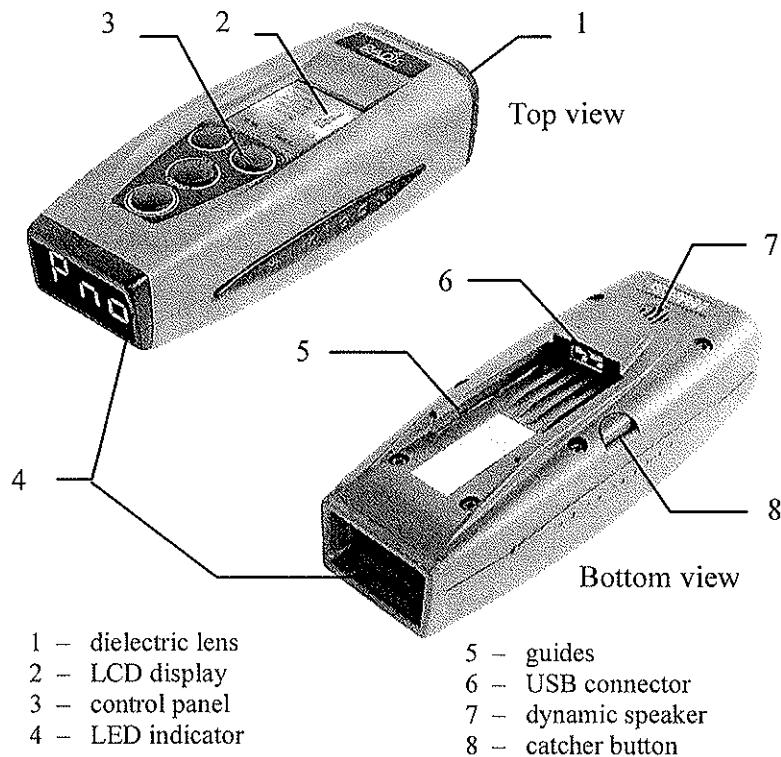


Fig. 2. Measuring unit design

Liquid crystal display [2] (further called LCD display) is located on top of the instrument front panel. LCD display is protected by the glued-in glass. Below the display is a control panel with cast-rubber buttons [3].

A light-emitting diode indicator (further called LED indicator) is located at the backside of the case. It is a high-light indicator safeguarded by a cast-rubber protector with the glued-in glass.

Detachable handle is connected to the police radar gun by means of special guides ([5] Fig. 2) and is fixed by a spring-loaded catcher. Connection with other power units is provided similarly.

To detach the handle, press the catcher button ([8] Fig. 2) and slide the handle along the guides.

Connection of the radar gun to the power unit (handle) is done through the USB connector ([6] Fig. 2 and [1] Fig. 3).

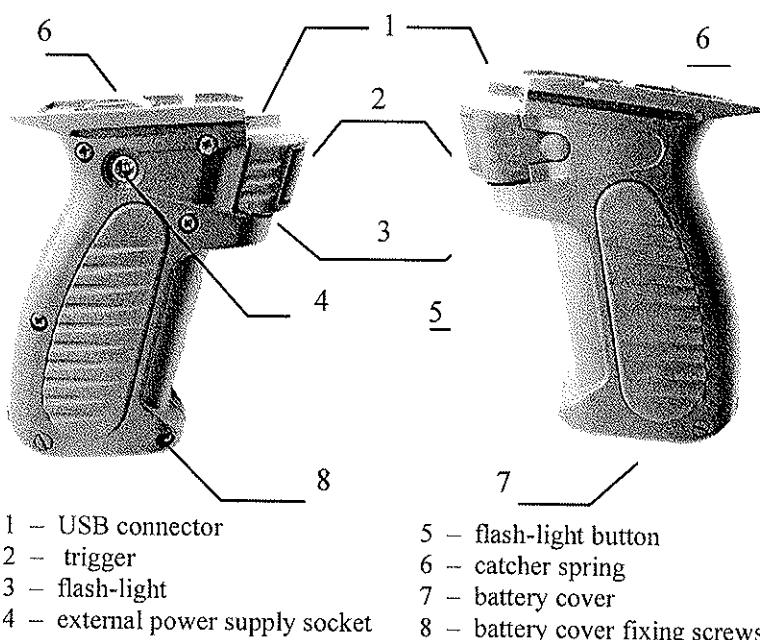


Fig. 3. Handle arrangement (power supply unit Type 1)

One of the police radar gun control buttons – a trigger for unit switching-on and start-up of measurements [2] – is located on the handle.

On the side face of the handle there is a socket for external

power supply unit and battery charger connection [4].

The handle is equipped with a flash-light [3] (used in the night-time to spot the documents). To the left of the trigger is the flash-light On/Off button [5].

In the bottom part of the handle is a detachable cover [7] shielding the battery compartment.

Moisture resistance and dust proofing of the police radar gun is achieved by sealing the splice areas of the police radar gun and dielectric lens with glue compounds, and by the elastic blinds and rubber protector.

The pilot holes from the handle side are encapsulated during instrument assembling. All plates of the radar gun are protected with lacquer coating.

6. IDENTIFICATION MARKING AND SEALING

6.1. Brand name, manufacturer code and serial number of the police radar gun are marked on the case.

6.2. The police radar guns accepted by quality control and prepared for packing are sealed by mastic seal onto screw of the police radar gun case.

6.3. Bag for transportation and storage has a proprietary label with the instrument name, specification and serial number.

7. GENERAL OPERATION INSTRUCTIONS

7.1. After unpacking and withdrawal from the transportation case, the police radar gun should be visually inspected for external damages and seal integrity.

7.2. During the acceptance procedure it is necessary to check the supplied set completeness according to the logbook.

7.3. Before switching the police radar gun on, it is necessary to read Chapters 8 and 9 of this operation manual.

7.4. If this instrument is taken indoors after being exposed to the temperatures below -10°C , it must be allowed to warm up for not less than 2 hours before switching on.

7.5. It must be taken into account that there is a number of reasons that may cause malfunction of the police radar gun. They are:

- presence of powerful electric disturbances from high-voltage power lines, welding units, lightning static discharges;
- use of the police radar gun in IMC (rainstorm or snowfall) conditions;
- presence of switched-on glow-discharge lamps at a distance less than 5m in the operation direction.

7.6. Do not direct the police radar gun on big metal objects located at a distance less than 0.5m.

7.7. Deformation and squeezing of the police radar gun case is not allowed.

7.8. Immersing the police radar gun in water and placing it under direct water streams is not allowed.

8. SAFETY MEASURES

8.1. The radiation level of the police radar gun in the backward direction does not exceed the current sanitation and epidemiological standards.

8.2. It is not allowed to stay for a long time at a distance less than 1m in front of the horn of the operating device. When the police radar gun is in operation mode, do not place the antenna anywhere near your head.

8.3. Electric voltages existing in the police radar gun do not exceed 12V and do not pose any hazards during operation.

9. CONTROLS AND INDICATORS

9.1. Control buttons

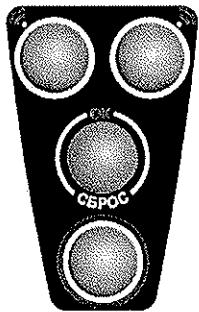


Fig. 4. Control panel

There are 4 buttons marked «↓», «↶», «OK/СБРОС»(in text below /СБРОС replaced by /RESET», «○» (Fig. 4) on the control panel. The two top buttons («↶», «↓») have variable functions which are appointed in the course of the device operation. The purpose of the buttons is indicated on the display. Button «OK/RESET» is normally used to execute the selected command.

Switching On the device is done:

- by the handle trigger when using handle (power supply unit Type 1);

In order to switch on the power, you should press the trigger and hold it in the pressed position until indication appears accompanied by a short sound signal.

Switching Off the power supply is done by a prolonged pressing (for about 2 second) of the right top button on the control panel, designated as «↓». Switching off the power supply is accompanied by a short sound signal. After switching off, all adjustments made in the instrument are kept and reproduced at the next switching on.

Starting of measurements and stopping of an automatic mode is done with the trigger or the button «○».

There are two indicators in the police radar gun: the LCD display and the bright light-emitting diode (LED) indicator.

9.2. LED indicator

LED indicator is located in the rear part of the case. The following information can be displayed with this indicator:

- selected operation mode;
- condition of the memory cells;
- measured speed value;
- time elapsed from the moment of excessive speed registration;
- direction of the fixed target movement;
- absence of measurement results.

The police radar guns are equipped with the energy-saving technology: on expiry of 3 seconds the letters on the indicator are switched to a flashing mode.

9.3. LCD display

More complete information concerning the current settings of the police radar gun (Fig. 5) and the results of measurements (Fig. 6) are displayed on LCD display.

Besides, the LCD display is used for instrument operation control using the on-screen menu.

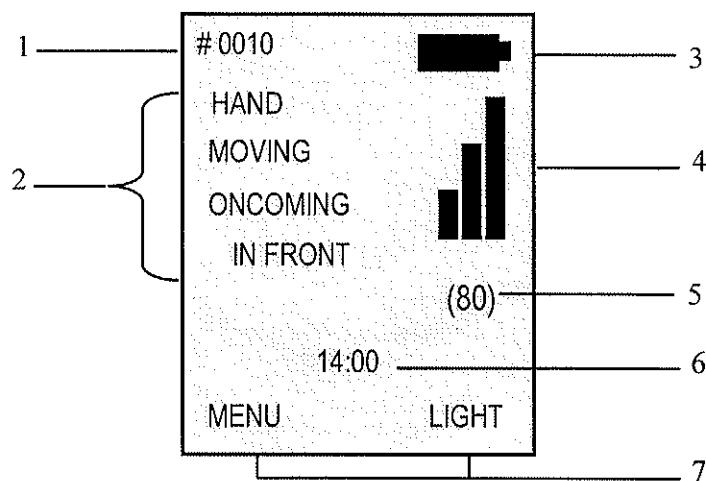


Fig. 5. Display in a standby mode

- 1 – identification number;
- 2 – selected operation mode;
- 3 – battery level condition*;
- 4 – specified distance range (sensitivity) of the instrument operation;
- 5 – specified speed limit;
- 6 – current time;
- 7 – functions of the top buttons on the control panel.

*Note: * - After switching on the device the battery charge indicator is not displayed. The indicator will show the condition of the battery only after taking at least one measurement (after the microwave oscillator is powered).*

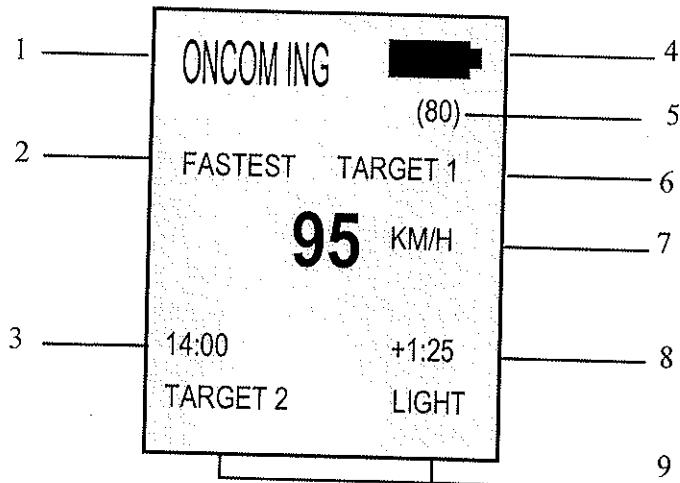
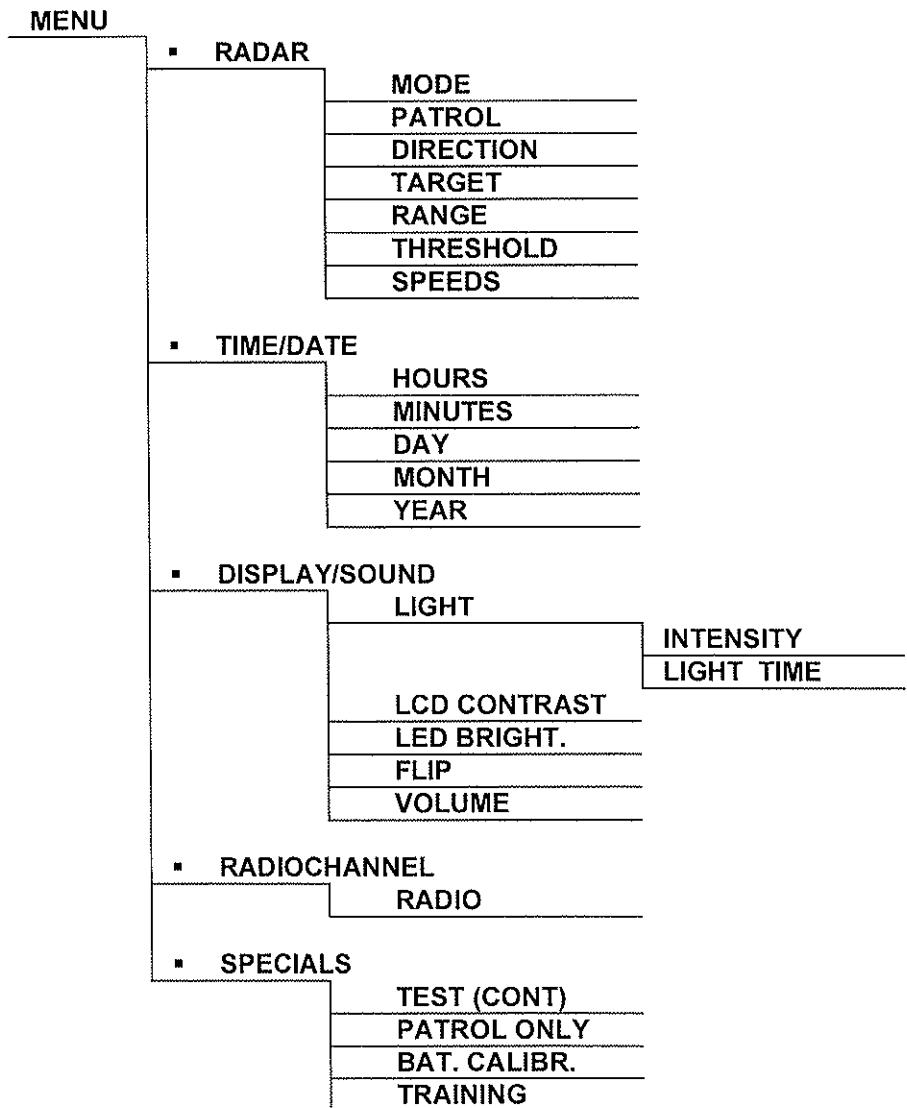


Fig. 6. Display in the mode of the measurements viewing

- 1 - direction of the measured target movement;
- 2 - target characteristics (fastest/closest);
- 3 - time stopped at the moment the measurement is fixed;
- 4 - battery level condition;
- 5 - specified speed limit;
- 6 - target's number (up to 2 targets can be stored in memory);
- 7 - value of the measured speed;
- 8 - time elapsed from the moment the measurement is fixed;
- 9 - functions of the top buttons on the control panel.

9.4. Structure of the instrument menu



The menu allows making the following settings:

- the instrument operation mode: hand/automatic, stationary/in moving, oncoming/out going/all targets;
- determine the target's location while operating in the moving mode: target in front / target behind;
- determine the speed limit value with 1 km/h increment;
- setting of the instrument sensitivity (distance range);
- service settings realization: current time and date; highlighting operation mode; display contrast; LED brightness; sound signal volume; display translation at 180° on the LED panel; measured speeds range;
- switch On/Off the radio channel for connection to external devices.

The following buttons are used when operating the menu:

«», «», and «OK/RESET». Entering the menu is done by pressing the button «», marked on the display as "MENU". The left and right top buttons on the control panel provide menu navigation, moving the highlighted line upwards or downwards. To execute the command or setting chosen in the menu it is necessary to press button "OK/RESET", having thus confirmed the selection. The required parameter will appear on the screen. Value (or status) of the parameter can be changed with the buttons «» and «», which are marked on the screen "PREV" (previous) and "NEXT". After selection of the required value or status it is necessary to press the button "OK/RESET" again. At displacement in the bottommost or topmost position in the list, the name of one of the buttons «» or «» changes to "EXIT". Following this command will bring the menu to the previous (next) level.



ATTENTION!

When the fixed traffic offender's speed is indicated on the display, access to the menu is blocked.

To continue working with the menu it is necessary to clear the data from the memory cells.

9.5. Buttons of quick access to the functions

For operational convenience there are buttons of quick access to different settings, the so-called «hot keys».

Description of those buttons in the text is marked with the symbol 

Summary table of the “quick access” buttons.

Buttons and pressing procedure	Function
Prior to start of measurements	Simultaneous momentary pressing of  and 
	Change-over of operation modes by cycle
	Momentary pressing of «OK/RESET»
	Change-over of targets direction “ONCOMING” ↔ “OUT GOING”.
	Pressing and holding of «OK/RESET»
When indicating the fixed target	Setting of direction “ALL TARGETS” for stationary mode; setting of “IN FRONT OF” ↔ “BEHIND” in “MOVING” mode
	Simultaneous pressing of  and 
	Decreasing of the preset speed limit
	Simultaneous pressing of  and 
	Increasing of the preset speed limit
When indicating the fixed target	Simultaneous pressing of  and 
	Momentary pressing of «OK/RESET»
	Change-over of target characteristics “FASTEST TARGET” ↔ “CLOSEST TARGET”
When indicating the fixed target	Momentary pressing of 
	Change-over of the indication results “TARGET 1” ↔ “TARGET 2”
When indicating the fixed target	Pressing and holding of «OK/RESET»
	Reset of all measurement results

10. OPERATION PROCEDURE

10.1. Settings and preparations

10.1.1. Instrument switching On/Off

Before switching the instrument on make sure the connection of the measurement unit to the power supply unit is secure.

To fix the police radar gun inside the patrol car use a special bracket.

This method of the radar gun fixation can be used both in stationary operation mode and in motion.

To switch the radar gun on, push and hold the trigger for about 2 sec. (when operating with the handle) or button «» on the metering block (when operating with alternative power supply unit). After a short signal is sounded the button (trigger) should be released, and symbol  will appear on the display for a short time (initialization mode). Then the operation mode effective before switching the device off should appear on the display.

The following information will appear on the display:

- identification number;
- operation mode (automatic or hand);
- patrol type (in motion or in a stationary position);
- target movement direction (oncoming, out going, all targets);
- location of the target (in front of or behind the moving patrol car) - for motion mode only;
- preset speed limit;
- current time (electronic clock);
- preset distance range (vertical bars).

The device is ready for operation. (Fig. 7.)

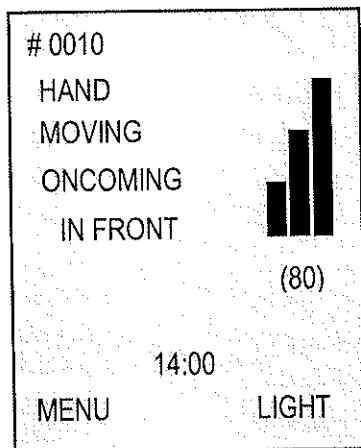


Fig. 7. Display indications after switching the device on.

Immediately after switching the power on the top buttons on the control panel are indicated as “**MENU**” and “**LIGHT**” on the display. In this condition the left button «» allows entering the menu and changing the device settings, if required, while the right button «» actuates the display illumination.

To switch off the device, press and hold (for about 2 seconds) the right top button «» on the control panel. Besides, switching the radar gun off takes place automatically if no control buttons have been pushed for 15 minutes. If the radar gun is left switched on indicating the measured traffic offender’s speed, the 15 minutes’ count will start upon termination of the guaranteed period for storage of the offender’s speed in memory (10 minutes).



Remember! The data of the registered offender’s speed is not preserved in memory upon switching the device off. To switch off the device before expiry of the 10 minutes’ period of saving the registered speed data in memory it is necessary to reset that data.

After switching the power supply off, all individual settings are stored in memory (paragraphs 10.1.2 – 10.1.7). If the radar gun is used together with the video framing device "KADR-1" or other, it is necessary to follow the switching on/off instructions given in the video framing device operation manual.

10.1.2. Setting of time and date

To set time and date, press "MENU" and select "TIME/DATE".

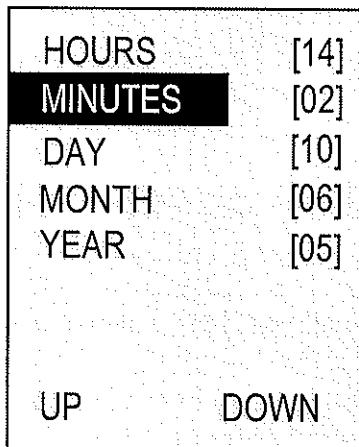


Fig. 8. "TIME/DATE" sub-menu

Using the buttons «» and «», select the parameter to be changed, press the button «OK/RESET» and change the parameter by means of the buttons «» and «» ("PREV" and "NEXT"). Confirm your choice by the button «OK/RESET» (Fig.8).

10.1.3. Setting the operation mode of the radar gun

To set the operation mode, press the button “” (“MENU”) and select the sub-menu “RADAR”.

Select the required parameter (mode, patrol, direction, target), then press the buttons  and  to change the parameter and confirm your choice by pressing .

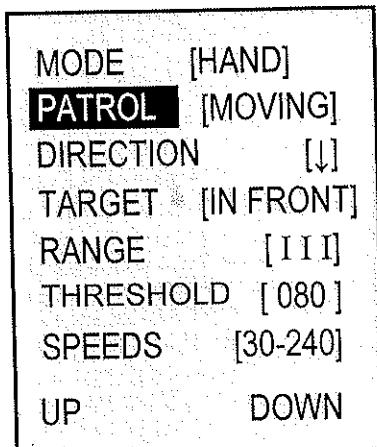


Fig.9. “RADAR” sub-menu

The parameter “MODE” accepts the settings [HAND] and [AUTO] which corresponds to the HAND and the automatic modes. The parameter “PATROL” accepts the settings [STAT] - stationary and [MOV] - moving.



“QUICK ACCESS” BUTTONS:

Simultaneous pressing of the buttons  and  changes the operation mode as follows: “HAND STATIONARY MODE” ⇒ “AUTO STATIONARY MODE” ⇒ “HAND MOVING MODE” ⇒ “AUTO MOVING MODE” and so on cyclically. Mode selection is accompanied by a short sound signal.

Motion operation mode is not provided in “Radis”-C police radar gun.

The parameter settings for "Direction" are marked by vertical arrows: [↑] – out going target; [↓] – oncoming target; [↔] – all targets. In the motion mode the target moving in the same direction as the patrol car is the co-direction target and that moving in the opposite direction is the oncoming target.

In a stationary position the co-direction target is the one moving away from the patrol car location; the oncoming target is that approaching the patrol car location.

The parameter "TARGET" accepts the settings **[IN FRONT]** if the target is situated in front of the patrol car (can be monitored through the wind screen) and the setting **[BEHIND]** if the target is situated behind the patrol car (can be monitored through the rear screen). The parameter "TARGET" appears on the screen menu only if the parameter "PATROL" is in the mode **[MOV]**.



“QUICK ACCESS” BUTTONS:

Momentary pressing of the button «OK/RESET» prior to making measurements will alternately change the selection of the targets movement direction:

“ONCOMING” ↔ “OUT GOING”. Mode selection is accompanied by a short sound signal.

Pressing and holding the button «OK/RESET» will set the mode **“ALL TARGETS”** which is accompanied by a double short sound signal (provided the Stationary operation mode has been selected).

If the operation mode **“MOVING”** has been selected, pressing and holding the button «OK/RESET» will change the modes **“IN FRONT” ↔ “BEHIND”**. Mode selection is accompanied by a triple short sound signal.

Motion operation mode is not provided in “Radis”-C police radar gun.

The operation mode pre-settings are shown on the display (see Fig. 5, 7). 5, 7.

The operation mode is shown on the indicator as the code abbreviations in red or green colors.

The red color of letters corresponds to the stationary operation mode, and the green color corresponds to the moving operation mode.

Indicator	Selected mode
	HAND mode for all targets
	HAND mode for oncoming targets
	HAND mode for out going targets
	Automatic mode for all targets
	Automatic mode for oncoming targets
	Automatic mode for out going targets

For energy saving reasons, after 3 seconds the letters on the indicator are switched to a flashing mode.

10.1.4. Setting of the speed limit

After switching on, the radar gun has the set threshold speed as was effective before last switch-off. Setting of the speed limit is performed through the menu. To do this, please select “RADAR” and set the required “**“THRESHOLD”** parameter by pressing «» and «», then confirm your choice by pressing «**OK/RESET**». Change of the speed limit setting is carried out with 1 km/h increment.



“QUICK ACCESS” BUTTONS:

To change the speed limit setting, please press one of the top buttons and the button «OK/RESET» simultaneously.

Press the left button «» and «OK/RESET» to decrease the speed limit.

Press the right button «» and «OK/RESET» to increase the speed limit.

10.1.5. Setting of sensitivity (distance range)

There are three levels of sensitivity and, accordingly, three distance range settings available for speed measurement with this radar gun: maximum, medium and minimum. The level of sensitivity is shown on the display by the number of vertical bars:



- maximum;



- medium;



- minimum.

Change of the parameter is done through the menu. Select the required value for the parameter "RANGE" in the "RADAR" sub-menu: [I I I] – maximum, [I I] – medium, [I] – minimum (see Fig. 9).

When the maximum range is selected in the stationary operation mode, the distance of the vehicle detection is up to 700-800 meters. With the medium range, the distance of detection is decreased to 500-600 meters, and with the minimum range – to 300-400 meters. Please note that the accuracy of speed measurement does not depend on the distance of measurement taking.

It should also be taken into account that in real work conditions operational distance ranges can vary considerably depending on the target dimensions, weather, disturbance levels, accuracy of «aiming», etc.

Besides, for measurement reliability in dense traffic, automatic decrease of the distance range for the target detection is

available. Thus, in the moving operation mode, for measurement of the out going targets the sensitivity is automatically decreased to 100 – 150 meters.

10.1.6. Setting of measured speeds range

By default, the radar gun unit is set to 30–240 km/h speed range. If required, this value can be changed between 10–300 km/h. To do this, select the "RANGE" option in the "RADAR" submenu and change its value (see Fig. 9).

10.1.7. Setting of the indicator operation mode and sound signal volume

There are the following settings for the display: display contrast, indicator brightness, highlighting time of the display, and the sound signal volume level. It is also possible to rotate the image displayed on the LED indicator by 180°.

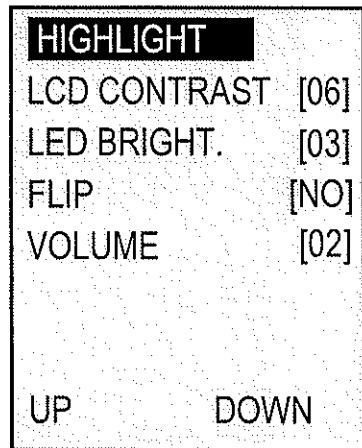


Fig. 10. “DISPLAY/SOUND” sub-menu.

To set the indicators operation mode and the sound signal volume enter the “**MENU**” and select “**DISPLAY/SOUND**”.

In order to adjust the LCD highlighting, please open the menu item “**HIGHLIGHT**” consisting of two parameters: “**BRIGHTNESS**” and “**HIGHLIGHT TIME**”. The display brightness is adjusted between the values of 0 to 10, and the time of highlighting (“**HIGHLIGHT TIME**”) can be set between 0 to 30 seconds.

The display contrast can be set within the limits of 0 to 15, corresponding to the minimum and the maximum contrast levels.

LED brightness can be changed by “**LED BRIGHT**” parameter (values from 0 to 3). At zero level the indicator is switched off, while the value [3] corresponds to the maximum brightness of the indicator.

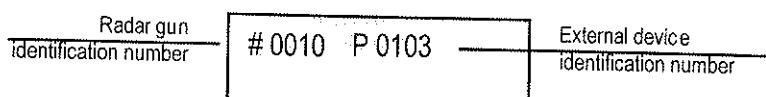
The parameter “**VOLUME**” has the values from 0 to 3. At the zero level the sound source is switched off, the value [3] corresponds to the maximum sound volume level.

The parameter “**FLIP**” can be set to [NO] and [YES]. If [YES], the LED indication will be turned half-way (180°) with respect to its normal position.

10.1.8. Connection of the external devices through the radio channel

To connect the external devices (remote control unit, computer, etc.) to the radar gun using the radio channel, it is necessary to switch this function on. To do this, select “**RADIOCHANNEL**” from the menu and set [ON] for the parameter “**RADIO**”.

The symbol «» will appear on the display. As soon as the external device is connected, the identification number of the external device will appear in the upper part of the display.



The external device has been connected through the radio channel.

If for 1 minute no external devices are switched on within the radio channel operation range, this function will be switched off automatically.

A more detailed description of the remote control unit operation procedure is given in Appendix 2 of this Manual.

10.1.9. Special operation modes

Mode "PATROL ONLY" is actuated through the menu (sub-menu "SPECIAL"). In this mode the patrol car's own speed only is displayed on the screen. The target speed is neither measured nor displayed. This mode is used for the radar calibration and other special measurements.

Mode "BAT.CALIBR." is used for calibration of the accumulator battery (further called "battery"). Calibration is to be carried out using the manufacturer's facilities.

Mode "TRAINING" is used for delayed start of police radar gun. This mode is to be used by manufacturer for testing purposes.

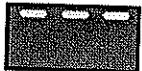
10.1.10. Indication of the reflected signal level.

The reflected signal level is shown on the LED indicator in the course of measurement taking.



- absence of a reflected signal

After a measurements cycle has been performed with the absence of signals reflected from the target (or signal level is too weak), three red horizontal dashes will appear for 2 seconds in the middle part of the indicator.



- excess of a reflected signal level.

Excess of the reflected signal level is indicated by red dashes appearing for 2 seconds in the top part of the indicator. Such excess may result, e.g., from making measurements of a large target at a close range.



- "loss" of a signal reflected from the road.

In motion, when the patrol car is moving in a non-steady manner, there is possibility of the so called "loss of the road" which is indicated by three green horizontal dashes in the bottom part of the indicator. More detailed information about operation in the moving mode is given in paragraph 10.3.1.

10.1.11. Battery condition indication

Monitoring of the battery condition can be done while **taking measurements**. The battery level indicator is shown in right top corner of the display and has a three-section structure: full charge, 2/3 charge, 1/3 charge.

When the charge falls to 1/3, the sound signal is given. Approximate time for operation in hand mode with 1/3 charge is 30 minutes. When the charge falls lower than 1/3 down to level, that is not sufficient for making measurements, the measurements are disabled. In this case, at the attempt to start the measurements the intermittent signal would be sounded and red horizontal dash will appear in the bottom part of the indicator.



- measurements are disabled.

In case of battery discharge below the acceptable level the device will automatically switch off.

More detailed information about the battery operation is given in Appendix 1.

10.2. Hand or Auto speed measurement modes in a stationary police radar gun position

10.2.1. Selection of mode and setting

Select "HAND" or "AUTO" mode and set the option "PATROL" to "STAT" position according to paragraph 10.1.3. of this Manual. Select the required direction of the measured targets' movement through the menu or with the button «OK/RESET»: "ONCOMING", "OUT GOING" or "ALL TARGETS".

The selected operation mode and direction will be shown on the display (see Fig. 7).

The **red-colored letters** will appear on the LED indicator, which corresponds to the **stationary operation mode**. For example, the red-colored indication  means that the stationary hand mode for oncoming targets has been set. (see paragraph 10.1.3.)

10.2.2. Speed measurement and viewing the results

In "HAND" mode the target speed measurement is made each time when the radar gun trigger (or the control panel button «») is pressed. When holding the depressed trigger, measurement taking is performed for so long as the trigger remains pressed.

The measured speed value is immediately shown on the indicator and display, and if it does not exceed the preset speed limit it will be displayed for 3 seconds or until the next pressing on the trigger.

In automatic mode, measurement taking is started by pushing on the trigger and continues until detection of the speed limit offender (when the offender's speed exceeds the preset speed limit). Taking measurements can be stopped by releasing the trigger followed by a prolonged pressing.

In automatic mode it is possible to change over the direction of the measured targets movement until the target is detected. The change-over is performed by pressing the button «OK/RESET».

If the preset speed limit is exceeded, a prolonged intermittent alarm signal will be sounded, the speed value will be shown on the indicator and display, and the 10-minute count of the timer will start.

For 10 minutes the following information will be displayed on the indicator by turns: the value of the detected target's speed, timer readings (time elapsed from the moment of speed fixation), and the direction of the detected target movement (Fig. 11).

The direction of the measured targets' movement is depicted on the indicator as follows:

onc - oncoming; **out** - out going; **ALL** - all targets.

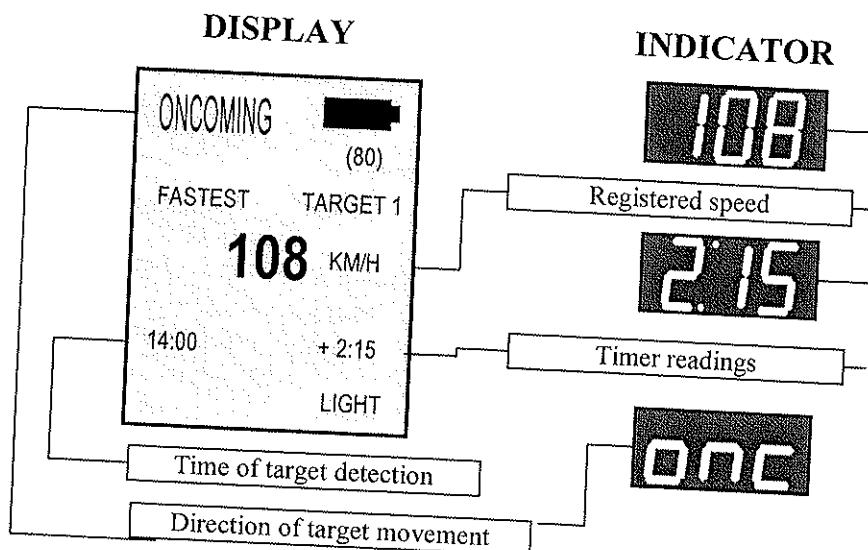


Fig. 11. Measured speed results shown on the display and indicator.

Besides, the target detection time, the radar operational modes, the detected target characteristics (fastest or closest target), and the target number are shown on the radar gun display (see Fig.11).

To change over the target characteristic from "fastest" to "closest" press the button «OK/RESET». The indicator message "FASTEST" will be changed to "CLOSEST". Detection of the fastest target in the traffic is performed by the radar gun when the target's speed exceeds that of the traffic group by 3 km/h and the echoing areas ratio is 1:100.

The term «CLOSEST TARGET» means the result of measurements of the target which gives the maximum reflected signal.

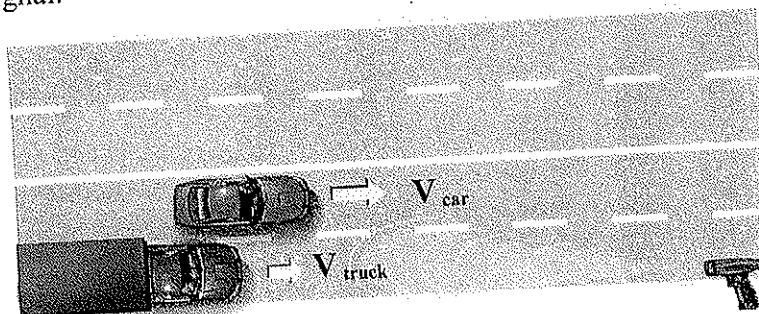


Fig. 12. Singling out the fastest or the closest target

Obviously, if there is a single target on the supervised road, the data for 'fastest' and 'closest' target will coincide.

If during measurement taking there were more than one target on the road, the numeric speed indications may differ. Thus, in the situation shown on Fig. 12 the speed of the motor car (V_{car}) is higher than that of the truck (V_{truck}) (e.g., during overtaking). Accordingly, in making measurements the motor car will be singled out as the fastest target. The truck which has the measured speed V_{truck} will be determined as the closest target since a stronger signal is reflected from it.



After fixing the offender's speed and displaying the measurement results on the display, the access to the menu is blocked. To reset the measurement results it is necessary to press and hold the button «OK/RESET».

10.2.3. Memory cells operation

The radar gun has two memory cells. If one case of overspeeding has already been registered and the measurement result is being shown on the display (see paragraph 10.2.2), the next pressing on the trigger will not lead to the data loss – the measurement results will be stored in the radar gun memory.

If the result of the next measurement is lower than the speed limit, the measured value will be shown on the display and on the indicator for 3 seconds or until the next pressing of the trigger.

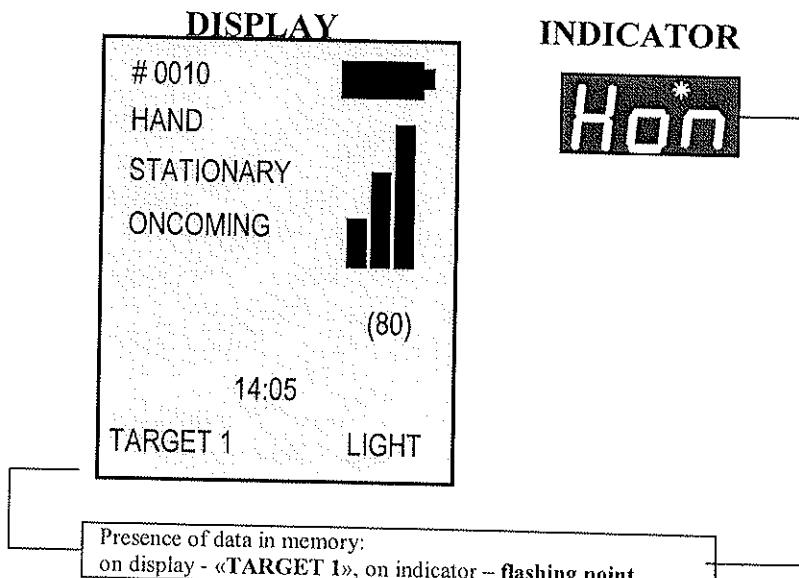


Fig. 13. Indication with a measurement result being in the memory cell.

After 3 seconds the data will disappear without changing the memory content. Letters corresponding to the set mode and a flashing point will appear on the indicator. (Fig. 13). At this moment, when the target data is stored in memory, access to the menu is blocked.



It is possible to change some settings with the help of the “quick access” buttons (see paragraphs 9.5. and 10.1.3), such as: switching over the operation mode, change of targets’ direction, and setting of speed limit. To reset the data in the memory cell, press and hold the button «OK/RESET».

For the data to be shown on the display and indicator, press the button «» (“TARGET 1”).

If the result of the measurements exceeds the speed limit – a sound signal is given and the value of the measured speed is shown again on the indicator and display. The fixed result is labeled “TARGET 1” and the 10-minute timer count for this target will start (Fig. 14).

The data of the previous target is stored in the memory cell under No. 2. In order to obtain information on the previous target and show the data on the display, press the button «» (“TARGET 2”). As a result, the values of the second target will be shown on the display and indicator and the button «» will be labeled (“TARGET 1”).

Number of memory calls is not limited. The storage time for the information about each target parameter is 10 minutes from the moment of data recording.

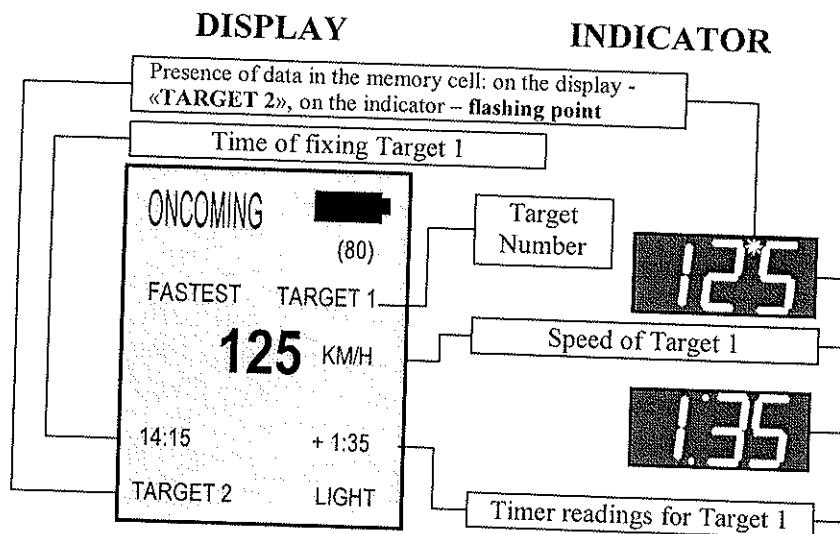


Fig. 14. Operation with two memory cells.

In the hand mode, when the radar gun trigger is pressed and held, the measurements are continued for as long as the trigger remains depressed. Besides, if the target speed is above the preset speed limit the maximal speed from among others fixed during this measurement period will be entered in the radar gun memory.

Reset of the memory data in both memory cells is done by prolonged pressing of "OK/RESET" button.

10.3. Speed measurement from a moving patrol car

Description of operation in the moving mode applies to “RADIS”-D model only.

10.3.1. General recommendations for the police radar gun operation in the moving mode.

In the moving mode, both the target speed and the patrol car's own speed is measured by the reflected signals from the road. The measured target's speed is displayed in red symbols, and the speed of the patrol car – in green symbols.

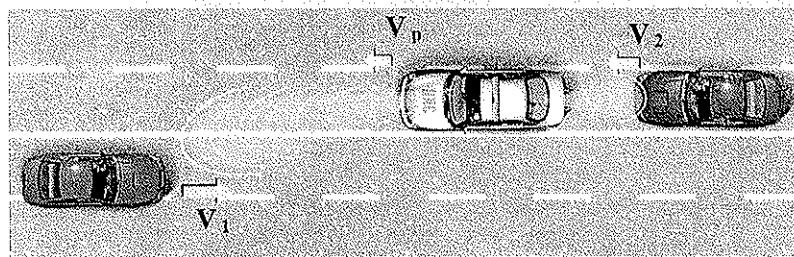


Fig. 15. Speed measurement in motion

V_p – the patrol car's own speed

V_1 – speed of the oncoming target

V_2 – speed of the out going target



ATTENTION!

While operating in the moving mode the following requirements should be met:

- It is possible to measure the target speed if the patrol car's own speed is not less than 30 km/h ($V_p \geq 30 \text{ km/h}$).

- It is possible to measure the out going target speed if the difference between the patrol car's own speed and that of the target is not less than 4 km/h ($V_2 - V_p \geq 4$ km/h). It is not of great importance whether the target is in front of or behind the patrol car, or whether the patrol car catches up or stays behind the target - in any case the correct evaluation of the target speed is guaranteed.
- Motion of the patrol car must be steady (maximum permissible change of own speed is ± 6 km/h per 1 second).

At each measurement the multiple impulse radiation and check-up of the motion steadiness is carried out. If, by any reason, own speed has not been measured with the first impulse, the device will automatically continue measurements making three more attempts. As soon as own speed is determined, three attempts of the target search shall be made.

When intensive acceleration, hard braking or sharp turns take place the radar gun is not able to determine own speed with the required accuracy and, consequently, can not give information on the target speed.

Failure to fulfill the requirement of own motion steadiness, or motion with the speed less than 30 km/h will lead to "loss of the road", which is indicated by three green dashes on the indicator.

Difficulties in determining own speed may occur when the patrol car moves in heavy traffic, or large targets are present close by. In such a case, the unambiguous determination of own speed is complicated, and the device will repeat attempts to measure own speed in automatic mode until the traffic conditions are more favorable.

In hand mode it is permitted to hold the trigger pressed for several measurement cycles so that to perform durable measurements.

While monitoring the out going targets speed it is recommended to decrease sensitivity in order to minimize interference.

Speed measurement in the “HAND – MOVING” mode

The “HAND-MOVING” mode is recommended for relatively heavy traffic flows in populated areas and allows “from hand” operation.

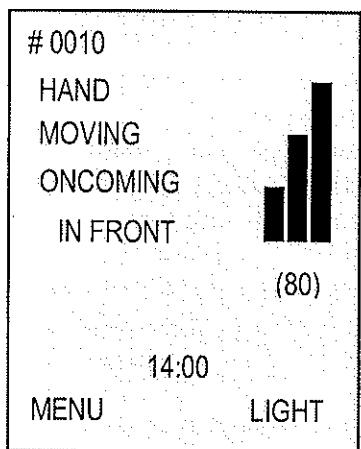


Fig. 16. The “Manual-Motion” mode.

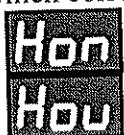
Select “HAND” mode in the menu and set option “PATROL” in “MOV” position according to paragraph 10.1.3. of this Manual.

Select the required direction of the measured targets movement through the menu or with the button «OK/RESET»: “ONCOMING” or “OUT GOING”.

Set the location of the measured targets (in front of or behind the patrol car – operation in motion through the wind screen or rear screen, see paragraph 10.1.3) by means of the menu or by pressing and holding the button «OK/RESET».

The selected operation mode and direction will be shown on the display (see Fig. 16).

The **green-colored letters** will appear on the indicator, which corresponds to the **moving operation mode**.



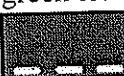
- Hand mode for oncoming targets

- Hand mode for out going targets

Point the radar gun to the measured target and press the trigger. Remember that the motion of the patrol car should be steady and its speed should not be less than 30 km/h.

If there are no targets moving in the selected direction then within 1 second the patrol car speed will appear on the LED indicator, always displayed as **green-color digits**. In 2 seconds the green letters showing the preset mode will appear instead of the green digits.

If it is not possible to determine own speed with the required accuracy (see paragraph 10.3.1), three green horizontal dashes will appear in the bottom part of the indicator, followed by the green letters corresponding to the preset mode.



If there is a target of the selected direction moving in a given section of the road, the target speed represented by the **red-color digits** will appear on the indicator. In case the speed is below the limit, the green letters will reappear in 2 seconds. If the target speed is higher than the preset speed limit, the sound signal will be given and the radar gun will indicate the registered result for 10 minutes.

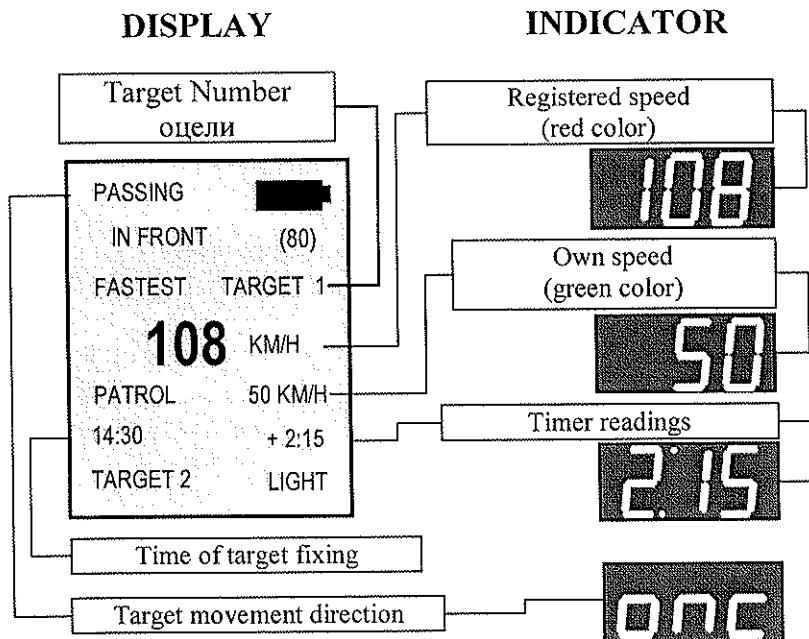


Fig. 17. Measurement results indication in motion mode.

The target speed, the patrol car own speed, time of the target fixing, information on the radar gun operation mode, and the target number will be shown on the LCD display simultaneously (Fig.17).

The following data will be shown by turns on the indicator for 10 minutes:

- result of the registered speed of the target (red digits for 3 sec);
- own speed (green digits for 2 sec);
- timer readings (time elapsed from the moment of target speed registration);
- movement direction of the fixed target.

When the second target is fixed, the data on the first target is stored in memory. More detailed description of operation with memory cells is given in paragraph 10.2.3.

When pressing the button «OK/RESET» the result of measurements of the closest (not the fastest) target is shown on the display.

Reset of memory stored in one or both cells is performed by pressing and holding the button «OK/RESET».

10.3.2. Speed measurement in the "Auto-Moving" mode

The "Auto - Moving" mode is used for out-of-town roads with moderate traffic density. When taking measurements it is advisable to fix the device inside the patrol car using a special bracket.

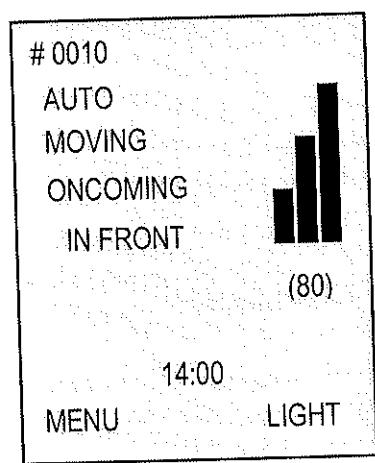


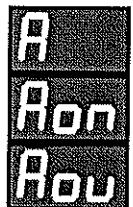
Fig.18. The «Auto - Motion» mode.

Select "AUTO" mode in the menu and set option "PATROL" in "MOV" position according to paragraph 10.1.3. of this Manual.

Select the required direction of the measured targets movement through menu or by pressing the button «OK/RESET»: «OUT GOING», «ONCOMING», «ALL TARGETS».

The selected operation mode and direction will be shown on the display (see Fig. 18).

The green-colored letters will appear on the indicator, which corresponds to the **moving operation mode**.



- Auto mode for all targets
- Auto mode for oncoming targets
- Auto mode for out going targets

When the patrol car speed reaches 30 km/h, you can start taking measurements by pressing the trigger. Normally in 1–2 seconds after switching the radar gun on, the patrol car’s own speed will appear on LED indicator as green color digits. The target speed is represented by red color digits.

During operation of the radar gun the switching of the movement direction for the measured targets is permitted until the target is fixed. Press the button «**OK/RESET**» and wait for the mode to change on the indicator.

The procedure of target fixing, work with memory cells, indication of the results corresponds to that described in paragraph 10.3.2.

11. MAINTENANCE

11.1. The maintenance procedure includes preventive maintenance and repair works.

11.2. The preventive maintenance shall be carried out by persons, who directly operate the radar gun. The preventive maintenance consists in timely battery recharging, appearance and performance tests.

11.3. The appearance test should confirm that the housing is free from deformations or cracks, while the cable is free from bends and breakdowns.

11.4. The functional test means operational testing of the basic modes.

11.5. Instructions concerning the battery recharging are given in the Appendix 1.

12. PERIODIC RECALIBRATION

12.1. Periodic recalibration for conformity of the general features to specifications is carried out not less than once in two years, as well as after repairs.

12.2. Recalibration is carried out according to recalibration procedure ГДЯК 468162.008 МП (GDJK 468162.008 OM).

12.3. Recalibration data is entered in the logbook.

13. REPAIR

13.1. Repairs of the radar guns shall be carried out by the manufacturing plant or service centers and local companies that have entered into a corresponding agreement with the manufacturer and that have been provided with required technical documentation and equipment. The list of service centers is enclosed.

14. STORAGE AND TRANSPORTATION

14.1. The radar gun should be kept during its guaranteed storage life in the manufacturer's packing at environmental temperatures of +5 to +40 °C and max 80 % relative humidity.

14.2. The radar gun should be transported by railroad transport in covered railcars, air or waterborne transport in sealed compartments, as well as by road transport without any speed or distance limitations and violations of permissible extreme conditions for environmental effects.

MANUFACTURER:

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E-mail: contact@simicon.com

Appendix 1. Operation from the batteries

For power supply of the radar gun, sealed lithium-ion accumulator battery (with the capacity of 1.8 A*h and the voltage of 7.4 V) is built into the radar gun handle (which has the battery recharger embedded).

The battery charging time is about 4-6 hours.

Time of operation from a fully charged battery (with measurement frequency being once every minute) depends on operation conditions and is not less than 8 hours.

Time of operation depends substantially on the ambient temperature and decreases with its lowering.

Battery charge information is indicated in the display. The charge indicator has a four-segment structure: full charge, 2/3 charge, 1/3 charge, 0 charge.

When the charge falls to 1/3, a sound signal is actuated. Approximate operation time in manual mode with 1/3 charge is 30 min.

When the charge falls lower than 1/3 down to level, that is not sufficient for making measurements, the measurements are disabled. In this case, at the attempt to start the measurements the intermittent signal would be sounded and red horizontal dash will appear in the bottom part of the indicator.



- measurements are disabled.

In case of the battery discharge below the acceptable level the device will automatically switch off.

Battery charge



The battery must be charged using only the supplied cable (for connection to the cigarette lighter socket).

The battery would not be charged at the ambient temperature below 0° C and above the 40° C.

Battery recharge is possible both when the power supply unit is connected to or when it's disconnected from the measuring unit.

For charging the battery of radar gun handle, the cable (for connection to the cigarette lighter socket) should be connected to the socket on the handle side surface (see [4] Fig. 3) and to the car's on-board power circuit or to the power supply adapter +12V.

The blinking LED(flash light) on the handle indicates a normal charging process. At full charge the LED goes out.

Battery replacement

The battery is located in the handle and is shielded with a cover.

For its replacement, unscrew the cover attachment screws (see [8] Fig. 3) and remove the cover.

Then disconnect the connector and remove the battery.

Insert a new battery in the direction shown by the arrow on its body and assemble the device in reverse order.

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