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1. INTRODUCTION

The manual is intended for learning a radar gun "Iskra-1", its characteristics and operation rules.

The manual is applied for all radar guns produced in accordance with technical conditions 4278-001-31002820-97 TY:

- Iskra-1 – direction selection, stationary mode only,
- Iskra-1 B – without direction selection, stationary mode only,
- Iskra-1 D – direction selection, stationary and moving modes.

2. PURPOSE

The radar gun is used by traffic police officers to control motor transport speed.

The radar gun is able to work both in stationary mode when it is fastened on a holder or is held in the hand, and moving mode when it is placed in patrol car¹. In the latest case the radar gun measures speed of both on-coming and follow targets.

The radar gun can be used in both manual and automatic performance modes.

It is possible to set a speed threshold, exceeding which will lead to speed value store, timer start and sound indication. The radar gun has 2 memory cells to store speed values with corresponding timer values (in manual stationary mode).

While performance in moving the speed is measured and the value is displayed with the speed value of patrol car.¹

The radar can be used with video-recording device Kard-1.

The radar gun is supplied by car board circuit or autonomous accumulator battery.

3. TECHNICAL CHARACTERISTICS

- 3.1. Working frequency 24.15±0.1 GHz.
- 3.2. Revealing distance, not less 300 m.
- 3.3. Measured speed range is 30-210 km/h.
- 3.4. Speed measurement error, not more ±2 km/h.
- 3.5. Speed measurement time, not more 1 sec.
- 3.6. Information store time in each of memory cells, not less 10 min.
- 3.7. Discontinuity of speed threshold value is 1 km/h.
- 3.8. Time of performance mode set, not more 5 sec after power supply.
- 3.9. Continuous performance, not less 16 hours.
- 3.10. Voltage is 11.0-16.0V.
- 3.11. Average consumed power, not more 8W.
- 3.12. Weight (with cable), not more 0.9 kg.
- 3.13. Size, not more 270 x 180 x 70 mm.
- 3.14. The radar gun select the fastest target from the stream if the speed exceeds for 10 km/h the others and ratio of their areas is not less 1:10.
- 3.15. The radar gun measures speeds of both on-coming and follow targets while working in moving patrol car. In this case, both target and patrol car speeds are displayed.¹
- 3.16. The radar gun displays the current time from threshold exceeding moment (for both memory cells). Indication starts from 1 km/h for speed and 1 sec. for time.
- 3.17. The radar gun can be used both in manual and automatic mode. In manual mode measurement is performed by pressing cock button, in this case the speed is measured once and then is indicated. In case of automatic mode periodical measurement takes place and current speed is indicated. When there is speed exceeding, measurement stops and speed is automatically stored in a memory cell with sound indication accompanying.
- 3.18. It is possible to change indicator brightness and sound level during exploitation.
- 3.19. The radar gun is protected from polarity reverse and indicates the decreasing of power supply.
- 3.20. The radar gun selects targets direction (except Iskra-1 B).
- 3.21. The radar gun keeps all its characteristics at the following weather conditions:
 - temperature, from -20 to +50 °C,
 - relative humidity, up to 90% without moisture condensation,
 - atmosphere pressure, 60-106.7 kPa.
- 3.22. The radar gun keeps its characteristics during 48 hours at following weather conditions:
 - temperature, form -50 to +55 °C,
 - relative humidity, up to 95% at +30 °C.
- 3.23. The radar gun keeps its characteristics after influence of 10 vibration cycles in frequency range 10-70 Hz with 0.15 mm amplitude.

¹ for Iskra-1 D models only.

- 3.24. The radar gun keeps its characteristics after influence of 4000 hammering with 10-50 hits/min frequency with max acceleration 150 m/sec^2 and 6 msec. duration.
- 3.25. The radar gun keeps its characteristics after influence of 3 hits with max acceleration 500 m/sec^2 and 3 msec duration.
- 3.26. The radar gun keeps its characteristics after influence of shaking while transportation with 50 - 120 hits per minute frequency during 2 hours with max acceleration 30 m/sec^2 .
- 3.27. The radar gun keeps its characteristics after free fall from 0.35 m on solid surface.
- 3.28. The radar gun keeps its characteristics at influence of external fields with 10V/m intensity in 10 KHz h 300 MHz frequency range and 3V/m 300 MHz h 1000 MHz frequency range.
- 3.29. Mean-time-between-failures, not less 5000 hours.
- 3.30. Average life time, not less 5 years.
- 3.31. Reverse influence density on 0.5 m distance and doesn't exceed 10 mcW/cm^2
- 3.32. The radar gun has a 3 m cable with connector for car cigarette lighter. The length and connector type can be changed in accordance with consumer wish.
- 3.33. It is possible to fasten the radar gun on car side window on special holder in stationary mode².
- 3.34. To work while moving there is a special beam to set the radar gun in the patrol car.
- 3.35. If the radar gun is used with video-recording device Kadr-1, the measured speed is displayed on video-recording device monitor.

4. COMPLETE SET

| | | |
|----|----------------------|---|
| 1. | Radar gun with cable | 1 |
| 2. | The user manual | 1 |
| 3. | Logbook | 1 |
| 4. | Transportation case | 1 |

Additionally the consumer can be supplied with:

1. Special beam for a patrol car.
2. Holder
3. Accumulator battery
4. Charger
5. Imitator to check radar gun efficiency
6. Remote control panel
7. Video-recording device Kadr-1

5. RADAR GUN ARRANGEMENT and PERFORMANCE

5.1. Operation principle.

The operation principle is based on Doppler effect – radio-locator signal frequency changing in case of reflection from moving object. The frequency change is proportional to the object speed. So determination of the speed comes to determination of difference between frequencies of radiated and reflected signals.

To analyze the frequency digit handling of lower frequency signals instrument on base of Fourier transform is used. Analyzing the results allows to select the fastest object speed, determine the own speed and object speed.

To select the objects by the direction two independent channels are used. Determination of relative phase shift between doppler signals of 2 channels allows to make a decision about moving direction. There is no second channel in radar guns without direction selection (Iskra-1 B model).

Output signals of 2 channels are received by calculator where digitization, saving and mathematical handling take place.

Information about speeds in digital format is transferred on control and indication chip. The radar gun control buttons and three-digit LED indicator are situated on the chip. After each measurement cycle ultrahigh frequency is turned off and it allows to decrease the radar gun hit mode, consumed power and increase protection.

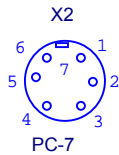
Control and indication chip realize information storing in memory cells, speed threshold set, indication the time from threshold value exceed and regulation of brightness and loudness and control of power source.

There are modulator and stabilizer of ultrahigh frequency generator power and micro-alarm on the chip. Also the chip performs commutation with controls and external connections. Special external connector is used for board circuit connection.

² Performance from the holder while moving is forbidden

To connect external devices and control main chains connector X_2 is used (see pic.1).

Pic.1. Connector X_2 .



Control output 1 (contact 3 of connector X_2) and 2 (contact 1) are used to check signal passing through linear part of both channels (there is no output 2 in Iskra-1 models). Contact 3 is used as input of digit data from external devices (RS232 protocol). Contact 1 is used to control target selection in moving mode in case of following targets. Connection contact 7 (common) switches the radar gun to the mode of the biggest target selection. Data output (contact 2) is for digital data transmit by RS232 protocol to external devices. Synchronizing pulse (contact 4) is used to start the external devices and to control ultrahigh frequency generator power.

5.2. Radar gun arrangement.

Antenna that includes generator, mixers, wave section and horn antenna is fastened on cylinder case. Amplifiers are assembled on it.

Control and indication chip is situated in back part of the case and is defended from external influence by rubber protector.

Metal handle is connected with the case by all-in-one connector. There is power supply chip, connectors X_1 (for cable connection) and X_2 (for external devices connection). Side areas of the handle are closed by plastic cover. If the covers are removed the power supply chip can be accessed. There is place for a accumulator in the lower part of the handle.

The cable has a removable connector to car cigarette lighter. It has connecting pipe with a connector to X_1 that is fixed by a screw. There is a LED indicator in the connector.

Antenna is closed by cone housing that is fixed in the base of antenna. Housing area is defended by rubber protector. Antenna dielectric lens is situated in the forward part of the housing. Radiation and radio signal receiving are realized through the lens.

Moisture resistance and dustproof of the radar gun are provided by capsulation. Input window is protect from the side of handle. Also all chips are defended by varnished cover.

6. MARKING AND SEALING

- 6.1. The radar gun serial number and name are plotted on the its body.
- 6.2. Radar gun is accepted by the Technical Testing Department, prepared for packing and sealed.
- 6.3. The transportation case has the label with radar gun and producer names.

7. GENERAL USAGE GUIDELINES

- 7.1. After unpacking the radar gun should be examined for damages and make sure that seal is intact.
- 7.2. Make sure that the set is complete according to the logbook.
- 7.3. It is necessary to learn 8 and 9 manual sections before turning the radar gun on.
- 7.4. When the radar gun is used under the temperature below -20°C , keep it under normal conditions during 2 hours, before use it again.
- 7.5. Wrong performance causes:
 - strong electric interference from electric power transmitting lines, welding devices, lightning.
 - performance at rain and snow;
 - working gas luminescent lamps 5 m in the measuring direction;
 - power supply failure.
- 7.6. Do not direct the radar gun on big metal targets at 0.5 m; min distance must be not less than 10 m.
- 7.7. Deformation and compression of the radar gun is not allowed.
- 7.8. Do not immerse the radar gun in water and under water streams.

8. SECURITY MEASURES

- 8.1. Do not stay during long in front of the working radar gun horn at 4 m. Being near the working radar gun at 0,5 m during 30 minutes is allowed. In any cases don't keep it near head.
- 8.2. The radiation level does not exceed the current sanitary and technical norms in reverse direction.
- 8.3. Radar gun voltages do not exceed 12 V and are not dangerous during performance.

9. CONTROLS AND INDICATIONS

9.1. To turn on the power press the button till you see the indication accompanied by short sound signal. To turn the power off press the button "mode" during 2 sec (indicator upper button).

9.2. Measurement start and automatic mode exit are performed by pressing the trigger.

9.3. The indication panel is situated on the back sloping surface under rubber protector. Displayed information:

- chosen performance mode;
- chosen speed threshold value;
- chosen sensitiveness (distance);
- gradations of brightness and loudness;
- moment of the measurements;
- power supplier condition;
- measured speed value;
- fixed speed exceeding and the time from the fixation;
- patrol car speed (for «ISKRA-1» D model only);
- memory cells conditions;
- impossibility of speed measuring.

9.4. Two buttons for the speed threshold, loudness and brightness adjustment are situated in the lower part of the indication panel. These buttons are also used for information recall from the memory.

9.5. There is a button of modes switching in the indication panel upper part. This button is used also for compulsory memory reset, where information about exceed speed is stored. Pressing the button during 2 sec will lead to turning off the radar gun. Power supply stop is accompanied by short sound signal.

9.6. Direction selection button is situated on the radar gun handle (for Iskra-1 and Iskra-1 D models only).

9.7. Indicators of chosen direction are performed in view of arrows and situated on left side of the handle.

9.8. The power connector is situated on the back surface of the handle under the indication panel.

9.9. The connector for external equipment is situated on the left part of the handle.

10. PERFORMANCE ORDER

10.1. Preparations for work.

10.1.1. Before connecting the radar gun to the board circuit, make sure that power supply cable is fasten well.

10.1.2. To use the radar gun on a car while working in the stationary mode, fasten the holder on the side window, place the radar gun on the clutch and secure it. Don't use this fastening method during working when moving.

10.1.3. To fastening the radar gun inside the car use the special beam (see Application 1).

10.1.4. Connect the cable to the car cigarette-lighter and press the trigger during 2 sec. The digit "5" will be displayed for 1 second after short sound signal, then the chosen working mode will appear in the middle of the indicator: the manual stationary mode is default with max sensitiveness level (indication: red letter P and 3 horizontal segments on both sides from the letter). In 5 sec horizontal segments will disappear. The radar gun is ready.

Direction selection arrow will show the target moving direction (for Iskra-1 and Iskra-1 D model only). Speed measuring of on-coming targets is a default mode after radar gun turning on.

To turn off the radar gun press the upper button on the indication panel during 2 sec. As well, the radar gun is switched off automatically if any of buttons is not pressed during 15 min. If the radar gun is left turned on with information about violator speed, the 15 min counting starts after guaranteed time of information storage (10 min.)

10.1.5. Short press the upper button on indication panel sets the needed working mode. Mode indication is a letter in the middle of the indicator:

- red letter "P" for Manual-Stationary mode
- red letter "A" for Automatic-Stationary mode
- green letter "P" for Manual-Moving mode
- green letter "A" for Automatic-Moving mode

In radar guns with energy-saving program, red letters switch to flashing mode after 20 sec.

Switching from stationary to moving mode (for Iskra-1 D models only) leads to automatic switching of direction selector to "following targets" mode.

10.1.6. Short press of direction selection button will set targets moving direction (for Iskra-1 and Iskra-1 D models only).

Attention! Targets moving direction is indicated by LED arrows on the handle side.

10.1.7. During performance in moving (green letters "A" or "P") the radar gun has 2 working modes:

- a) to measure speed of targets moving in front of patrol car
- b) to measure speed of targets moving behind the patrol car.

Case (a) is a default. LED arrow is displayed continuously. To switch to (b) case, press the direction selection button during 2 sec till you hear short double sound signal. After that the LED arrow starts blinking. Pressing the button again will lead the radar gun to initial condition.

Attention! Blinking arrow show that the radar gun is ready for performance with targets moving behind patrol car. Keep in mind that measured targets moving direction is always shown by LED arrow and is switched to reverse by short pressing corresponding button.

10.1.8. In stationary working modes (red letters "A" or "P") both arrows disappear by pressing direction selection button during 2 sec and the radar gun switches to working mode without direction selection. Repeat press switches on the selection.

10.1.9. Speed threshold setting

After turning the radar gun on, the threshold speed of 72 km p.h. is automatically set. Change of this value is possible if the letters "A" or "P" on the indication panel are present without dots. If the dots blink (i.e. the memory contains information about speed measured before), it is necessary to press the upper button for memory reset first. Then press one of the lower buttons. The speed threshold value will appear on the indicator. Hold the button pressed, and continuous change of the threshold value with 1 km p.h. step will take place. Releasing the button fixes the threshold value. Press left button to decrease value, right – to increase.

10.1.10. Distance (sensitiveness) value setting

It is possible to set 3 levels of speed measuring distance: max, min and average. The level is indicated by number of horizontal line on both sides from the letter "A" or "P" (e.g. P , =P=).

Max level is set as default. In this case the revealing distance in stationary mode is 700-800 m (target – passenger car). The radar gun has the same distance level in moving mode while measuring on-coming targets. The manual switching allows to increase or decrease the distance for 20-30%. The distance level is decreased for 100-150 m. in moving mode while measuring following targets.

Keep in mind that large distance dispersion can take place under real working conditions. The real distance depends on target size, weather, noise level, rain drops on car wind screen, aiming precision, etc. Also, automatic target revealing distance increasing is provided to increase measurement reliability in conditions of fast moving. However, in any case, more horizontal lines indicate longer revealing distance.

To change the distance:

1. Press together two lower buttons, in case the letter "A" or "P" is indicated. Then, only horizontal lines will be displayed and letter of working mode will disappear.
2. Press left button to decrease the distance, right – to increase. Number of lines will change.
3. If the buttons are not pressed during 3 sec the radar gun will return to the working mode. The corresponding letter will be displayed and the number of lines will show sensitiveness level. For power economy the sensitiveness indication will disappear after 5 sec.

10.1.11. Indicators brightness setting

After turning on the radar gun maximal brightness of the indicators is automatically set. To change it:

- set the manual stationary mode,
- direct the radar gun upwards and to press the trigger once,
- after three dashes appearance press the right button and to hold it. "888" be displayed. The indication will blink and change brightness with 1 sec frequency.
- release the button after obtaining the most suitable brightness level from the four possible ones.

10.1.12. Loudness of the sound signal setting.

After turning on the radar gun the maximally possible level of the sound signal loudness is automatically set. To change it:

- set the manual stationary mode,
- direct the radar gun upwards and to press the trigger once,
- after three dashes appearance press the left button and to hold it. "ГP3" will appear and change to "ГP2", "ГP1", "ГP0", then again to "ГP3" and so on. Each change of loudness will be accompanied by a short sound signal of the corresponding level. When "ГP0" is turned on there is no sound signal,
- release the button after obtaining the most suitable loudness level from the four possible ones.

Note: This algorithm is used for loudness adjustment of service signals that confirms turning on some of the levels. Alarm loudness remains unchanged and max.

10.1.13. To use the radar gun with autonomous power supply see recommendations in Application 2.

10.1.14. If the radar gun is used together with video-recording device Kadr-1, it is necessary to perform the requirements from user manual of latest.

10.2. Speed measuring in the manual stationary mode.

It is the simplest mode and the most secret one.

10.2.1. Choose Manual-Stationary mode by means of the upper button which corresponds to the red letter "P" on the indicator (see p.10.1.5.) and set needed moving direction of measuring targets (see p. 10.1.6.). The radar gun measures targets speeds, direction of which coincides with arrow on the handle (in case of Iskra-1 B – of all targets).

10.2.2. The generator turning on and speed measuring take place at each trigger press. The measured value is indicated and stored for 3 seconds or till the next trigger press.

ATTENTION!

1. During measurements a single red segment appears in the middle of the indicator. Its location shows the power supply condition. If it appears in the upper part of the indicator the battery is fully charged, if it is in the middle part - the battery substantially discharged,

2. Indication in the lower part means that the battery is fully discharged and requires charging. Indication is accompanied by short triple sound signal. It means that automatic radar gun blocking took place and measurement is not possible. In this case, turn off the power and recharge the battery.

3. After measurement cycle, if there is no signal, three red dashes appear in the middle of the indicator. The red dashes appear in the upper part of the display in case of exceeding the acceptable signal level (a big target at 15-20 m distance).

10.2.3. If the speed exceeds the threshold value signal sounds takes place and the speed value is indicated and stored during 10 minutes or till the next trigger press.

10.2.4. During 10 minutes the time passed from the recording moment is indicated for 3 seconds every 6 seconds.

10.2.5. The next trigger press does not lead to loss of the information: the speed of the first target stored in the radar gun memory, and after the termination of the second measurement the second speed value with the blinking left dot (the sign of information presence in the memory) is indicated. If the newly measured speed is less than the threshold value, the letter "P" with the blinking left dot will appear in 3 seconds. If it is more than threshold value, the signal sound will appear and the second target speed value is indicated and stored for 10 minutes or till the next trigger press. If the left dot is blinking, it shows that first target speed value is store in the first memory cell.

10.2.6. Reading information from the memory is performed by the lower buttons: the first target is recalled by the left button and the second - by the right button. The quantity of readings from the memory is not limited. Information is stored during 10 minutes from the fixation moment. Dots blinking shows presence of the information about the target in the memory.

10.2.7. If the next measurement result is less than threshold value the memory contents does not change and the measured value will disappear from the indicator after 3 seconds. The letter "P" with the two blinking dots will appear on the panel. But if the result is more than the threshold value the information in the memory is replaced by newly obtained data.

10.2.8. Memory rest is performed by upper button (in both cells).

10.3. Speed measuring in automatic stationary mode.

This mode is better to use placing the radar gun on the car side window by means of a holder.

10.3.1. Set Automatic-Stationary mode by the control button which corresponds to the appearance of the red letter "A" on the display (see p.10.1.5.). In this mode the radar gun uses only with one memory cell.

10.3.2. Choose needed moving direction of measured targets (see p. 10.1.6.)

10.3.3. To start measurement it is necessary to press the trigger. Turning off is also performed by the trigger which should be hold during 1-2 s (till the end of the current SHF pulse).

10.3.4. When the target is in the measurement area its speed value is indicated every second.

10.3.5. If the speed exceeds the threshold value, measurement process stops and the speed value is indicated accompanied by sound signal.

10.3.6. The time passed from the speed fixation moment is indicated for 3 seconds every 6 seconds.

10.3.7. The memory reset takes place after 10 minutes or by pressing the trigger, the radar gun switching to the automatic working mode again.

10.4. Speed measuring in the manual moving mode (for Iskra-1 D models only).

The Moving mode is turned on by upper control button. Mode indication is green letter "A" or "P". This mode allows to measure speed of targets that move in direction of arrow on the radar gun handle (see p. 10.1.7).

The arrow show the moving direction of targets in accordance with direction of radar gun radiation. Arrow indication mode can be permanent or flashing. Permanent mode shows that targets are in front of the patrol car, the flashing one – that they are behind it.

The speed is measured if the patrol car speed is 30 km/h or more.

The speed of a target moving in reverse direction is measured if sum of cars speeds (passenger car and patrol car) is 60 - 250 km/h.

The speed of a target moving in the same direction is measured is the difference between speeds is 4 – 100 km/h. And it is not very important where the target is situated: in front of the patrol car or behind it.

10.4.1. Manual-Moving mode

This mode is used in case of relatively intensive traffic streams. Hand performance is allowed in inhabited locality.

- 10.4.1.1. Set Manual-Moving mode by means of upper control button. Green letter "P" should appear on the indicator.
- 10.4.1.2. Choose targets view area and moving direction by direction selection button (see p. 10.1.6. and 10.1.7.).

Pressing the button during 2 sec. will lead to view area change (in front of patrol car – arrow is permanently indicated; behind the patrol – arrow is flashing).
Short press leads to switching between moving directions.
- 10.4.1.3. Direct the radar gun on the target (its situation and direction should coincide with values set in p. 10.4.1.2.) reach the 30 km/h speed and press the trigger.
- 10.4.1.4. If there is no target in one second the patrol car speed will be indicated that is always indicated by green color. In 2 sec green letter "P" will appear.
- 10.4.1.5. If there is a target, its speed will be indicated by red color. If the speed is less than the threshold value green letter "P" will appear again. If the speed is more than the threshold value the radar gun indicates the speed value accompanied by sound signal. The violator speed (red numbers, for 3 sec) and patrol car speeds (green numbers, for 2 sec) are periodically displayed during 10 min.
- 10.4.1.6. In case, there is no measurement of the patrol car speed, hold the trigger.

10.4.2. Automatic-Moving mode

This mode is usually used on highways with small traffic intensity. In this case, it is better to fasten the radar gun on the special beam inside the car to measure on-coming targets speeds. If it is necessary to measure the speed of following targets use the radar gun from the hand.

- 10.4.2.1. Set Automatic-Moving mode by means of upper control button. Green letter "A" will appear.
- 10.4.2.2. Perform p.10.4.1.2.
- 10.4.2.3. Direct the radar gun in accordance with adjustment from p.10.4.2.2. when the patrol car reaches 30 km/h speed and press the trigger. Usually in 3 sec after turning on the patrol car speed is displayed by green numbers, then –the target speed by red ones.

Note: Moving direction changing is allowed during radar gun performance. in this case press the direction selection button during 1-2 sec.

10.4.2.4 Attention!

Frequent patrol car speed measuring and stability checking takes place during each impulse. The speed is measured in case of eve patrol car moving (max allowed speed changing is ± 6 km/h during 1 sec). In case of acceleration, braking or turning it is impossible to get right speed value, therefore it is also impossible to measure target speed. Written above is called "road lose". The radar gun will inform about it by three green dashes on the indicator and triple sound signal and then will turn to "road search" mode. It can be different the own speed in case of intensive traffic stream and presence of big targets the car. In this case the radar will try to measure the speed till the conditions improve. As a rule, the own speed is measured during 1-3 sec. If after 6 sec (10 attempts) there is no measuring, green letter "A" will be indicated. In means that the traffic conditions are inconvenient for measuring. Improve own speed and repeat the measurement.

Keep in mind! In any performance mode the arrow shows target moving direction.

10.4.3. Target speed indication in moving mode.

- 10.4.3.1. "Target" mode is set as a default. The radar gun indicates the fastest target speed direction of which coincides with direction selection arrow. If the speed is more than the threshold value, measured speed is indicated (see p. 10.4.1.5.) accompanied by a sound signal.
- 10.4.3.2. "Road" mode is turned on by pressing the upper button after trigger press. Only the speed of the patrol car is indicated. If there is a target in the measurement area, only sound signal will appear and the patrol car speed will be still indicated. Target speed is indicated in case of increasing threshold value. The measurement stops and indication in accordance with p. 10.4.1.5. appears accompanied with sound signal.

11. TECHNICAL MAINTENANCE

- 11.1. Technical maintenance includes preventive works, periodical calibration on the base of technical conditions and repair.
- 11.2. Preventive works (check of external condition and efficiency) are held by person who uses the radar gun.
- 11.3. Pay attention for presence of deformations, case cracks and cables breaks.
- 11.4. To check the efficiency see p.12.4.2
- 11.5. Periodical calibration in accordance with technical conditions requirements is held ones a year on the base of calibration methods p.12.

12. CALIBRATION METHODS

This methods spread on the radar guns of Iskra-1 series. Calibration period is 1 year.

12.1. Calibration operations.

12.1.1. Operations performed during the calibration.

Table 1.

| Operation | № of methods section | Kind of check | |
|---|----------------------|---------------|------------|
| | | primary | periodical |
| 1. Common examination | 12.4.1. | + | + |
| 2. Testing | 12.4.2 | + | + |
| 3. Working frequency | 12.4.3 | + | + |
| 4. Speed measuring error at 300m distance | 12.4.4 | + | + |
| 5. Selection of the fastest target | 12.4.5 | + | + |
| 6. Speed measuring in the moving mode | 12.4.6 | + | + |

P. 6 is for Iskra-1 D models only.

12. 2. Calibration means.

12.2.1. Equipment used for the calibration.

Table 2

| Name | Type |
|------------------------|-----------------|
| 1. Speed imitator | ИС - 24 |
| 2. Oscillograph | С1-76 |
| 3. power source | Б5-7 |
| 4. Electronic counting | Ч3-66 |
| 5. Rubber protection | ГДЯК 468355.000 |

Notes: 1. All calibration means must be calibrated in accordance with rules ПП 502.006-94.

2. Using of other calibration means is allowed, but it must have not more 1/3 from allowed error.

12.3. Calibration conditions.

12.3.1. The calibration is held under the following conditions:

- air temperature, $(20 \pm 5)^\circ\text{C}$,
- relative humidity, 30-80 %,
- atmosphere pressure, 84 - 106 kPa,
- voltage $(13 \pm 0.5) \text{ V}$.

12.3.2. The calibration is held by Government Calibration Departments of Russia.

12.4. Calibration process.

12.4.1. *External examination.*

The following is checked without power supply:

12.4.1.1. The set.

12.4.1.2. Presence of deformations, case cracks and cable breaks.

- 12.4.1.3. Seal, serial number and marking.
- 12.4.1.4. Right mechanical performance of all buttons.
- 12.4.1.5. Presence of case corrosion.

12.4.2. Testing.

Manual mode.

- 12.4.2.1. Place the radar gun on the speed imitator, turn on the manual mode and turn off the direction selection (see. p. 10.1.6).
- 12.4.2.2. Set target speed to 30 km/h and turn on the target generator. Turn the switch "Error mode" to "Mode" position.
- 12.4.2.3. Press the trigger. Speed value 30 ± 2 will be indicated. Release the trigger and make sure that this value is indicated for 3 sec and then disappears.
- 12.4.2.4. Set target speed to 90 km/h value.
- 12.4.2.5. Press the trigger. Speed value 90 ± 2 will be indicated accompanied by sound signal.
- 12.4.2.6. Set target speed to 120 km/h value.
- 12.4.2.7. Press the trigger. Speed value 120 ± 2 will be indicated accompanied by sound signal.
- 12.4.2.8. Recall the first memory cell by control button. Speed value 90 ± 2 should appear and stay. Make sure that the time is periodically indicated.
- 12.4.2.9. Recall the second memory cell by control button. Speed value 120 ± 2 should appear and stay. Make sure that the time is periodically indicated.

Automatic mode.

- 12.4.2.10. Perform p.12.4.2.1 and p.12.4.2.2.
- 12.4.2.11. Turn on the automatic mode. Make sure that speed value 30 ± 2 is periodically displayed, then stop the measurement.
- 12.4.2.12. Set the speed to 90 km/h value.
- 12.4.2.13. Turn on the automatic mode. Speed value 90 ± 2 should appear and stay, accompanied by sound signal.
- 12.4.2.14. Make sure that the time is periodically displayed and then turn off the target generator. Make sure that the information is store for 10 min.
- 12.4.2.15. Turn the radar to the manual mode. Make sure that pressing the left lower button lead to decreasing of threshold value, right – to increasing. Make sure that threshold can be set in the 30-80 km/h range.
- 12.4.2.16. The radar gun is tested if it corresponds to p.12.4.2.

12.4.3. Working radiation frequency control.

- 12.4.3.1. Place the radar gun to frequency counter or to speed imitator, if the latest has wave signal output of the radar gun
- 12.4.3.2. Measure the frequency in accordance with frequency counter manual.
- 12.4.3.3. The radar gun tested if its working radiation frequency is in 24.15 ± 0.1 GHz range.

12.4.4. Speed measurement error control at 300m distance.

- 12.4.4.1. Place the radar gun to the speed imitator. Set threshold to the 180 km/h value, turn off the direction selection and turn on the automatic mode.
- 12.4.4.2. Turn the switch "Mode - error" to "Error" position.
- 12.4.4.3. Use the radar gun to measure set speed values 30, 70, 90, 120, 150 and 180 km/h.
- 12.4.4.4. The radar gun is tested if the error for all speed values is not more than ± 2 km/h.

12.4.5. The fastest target speed measurement error control with a noise.

- 12.4.5.1. Place the radar gun to the imitator, set the threshold to the 150 km/h value, turn off the direction selection and turn on the automatic working mode.
- 12.4.5.2. Turn on the switch "Noise" on the speed imitator.
- 12.4.5.3. Measure the three speed values 70, 90 and 120 km/h by the radar gun.
- 12.4.5.4. The radar gun is tested if the error for all speed values is not more ± 2 km/h.

12.4.6. Speed measurement error in moving mode..

- 12.4.6.1. Place the radar gun to the speed imitator, set the threshold to 150 km/h value, turn off the direction selection and turn on the automatic moving mode.
- 12.4.6.2. Turn the switch "Mode – error" to "Error" position.
- 12.4.6.3. Turn on the "Moving" mode on the imitator and set "60/90" speed value.
- 12.4.6.4. Measure your own speed (green indicator) and measure the target speed (red indicator). Determine the error relatively to set 60 and 90 km/h value, correspondingly.

12.4.6.5. Repeat p.12.4.6.4 for moving mode at "80/130" speed values.

12.4.6.6. The radar gun is tested if the error is not more ± 2 km/h for both own and target speeds.

12.5. Calibration results registration.

12.5.1. The results about first calibration are register in the logbook.

12.5.2. Conclusion about the radar gun condition are registered in the logbook in accordance with performance results of p.12.4.1 - 12.4.6 of the manual.

12.5.3. The radar guns that are calibrated with positive results gets a corresponding certificate.

12.5.4. If the testing results are negative the radar gun is not allowed for using and gets special confirmation about failures in accordance with special form ПП 50.2.006-94.

13. REPAIR.

13.1. The repair of the radar gun (except the power supply cable) is hold by the producer or its region representative, who has signed the special contract.

13.2. The power supply cable can be repaired by technical personnel who uses the radar gun. It is not necessary to harm the radar gun seal. Don't use acid soldering flux.

14. STORAGE and TRANSPORTATION

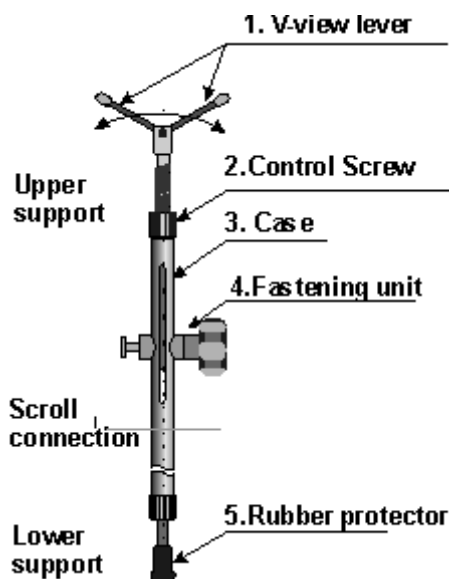
14.1. During warranty period the radar gun should be stored in producer case at $+5$ до $+40$ °C air temperature and 80 % relative humidity.

14.2. The radar gun should be transported by railway in covered carriage, by air and water – in hermetical sections, and also by car without speed and distance restrictions.

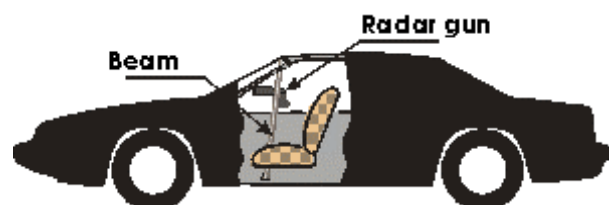
Applications

Application 1. The special beam to use in the car.

The beam is a specially developed rotating support, that is suitable to use in any car. The beam has the case 3, where upper and lower supports are fixed on lever 1 with rubber tips. The nut 2 allows to fix the upper support on the distance you need. There is a fastener 4 for the radar gun in the middle of the beam. The lower rotating support is springing and has a rubber tip 5. It is possible to disassemble the beam. The beam must be placed on the right side from the transmission lever the way you see at scheme 3. Adjust the beam height by means of the nut. The height must be 3-4 cm more than the distance between car floor and windscreen. Place the lower support on the floor, press on the beam case 3 and pull it to rubber windscreen compaction. Release the beam case carefully. See the right position on Pic.3.



Pic.2. The beam to work while moving.



Pic. 3. The beam position in a car

Place the radar gun horizontally on the fastener 4 (pic.2.). Change the fastener height if necessary. Don't make big effort while fastening the radar gun on the beam.

If it is necessary to change the measurement direction, free the nut and rotate the radar gun. Fix the nut again.

Application 2. Performance with the accumulator battery

2.1. APPLICATION CONDITIONS.

Lithium-ion hermetical accumulator battery (voltage 7.4V, capacity 1.5A/h) are used for the radar gun performance. The accumulator is placed in the radar gun handle.

The performance time (1 measurement per minute with the max brightness) is 12-16 hours and depends on accumulator condition.

The performance time considerably depends on air temperature (from -20 to +40 °C) and decreases under temperature decreasing

The performance time considerably increases if the indicator brightness is increased.

ATTENTION. To avoid the accumulator failure:

- defend from hits and high temperatures,
- don't make an effort to place the accumulator into the radar gun,
- don't use the accumulator after indication of lower power.

2.2. INSTALLATION AND CONNECTION.

Disconnect the cable of board power supply from the handle.

Place the accumulator into the handle till you hear the fixation click. The arrow on the accumulator must be directed forward.

Don't make an effort while inserting the accumulator because all elements completely correspond each other and provide reliable connection without any effort. If the direction of placement is wrong the complete fixation is not possible. Effort can harm the radar gun.

After inserting the accumulator, turn on the radar gun in accordance with the manual and adjust the indicator brightness.

ATTENTION! The accumulator performance time will considerably increase if:

- 1) The indicator brightness is decreased (decreasing the brightness from max value to min value doubly increases the accumulator performance time).
- 2) The information about measuring is not stored on the indicator panel without necessity. When the information becomes useless, we recommend you to reset the memory by means of the upper button of the radar gun.

Performing of these recommendations allows to increase the time for 2-3 items.

2.3. TECHNICAL MAINTENANCE.

Charging the accumulator should be held at the temperature not lower than 0° C.

Two color LED indicator shows the charging device working mode. If there is no accumulator the green LED is on. Charging process is indicated by red color. Switching to green color with connected accumulator means that the accumulator voltage has reached nominal value. To charge the accumulator completely leave it for 1-2 hours. The charging device automatically decreases the current for not to harm the accumulator. Charging time is 3-4 hours.

The accumulator can be charged inside the radar gun by means of board circuit of the car through the car cigarette lighter. There is two color LED on the connector. Green color appears when the cable is disconnected or the accumulator is fully charged. The charging is indicated by red color. The time of charging increases if the process of charging is held along with the radar gun performance.

We recommend you to charge the accumulator at once after discharging. Don't stored the accumulator discharged for a long time and under lower temperatures.

Don't open the accumulator for its repair.

2.4. ACCUMULATOR TESTING.

Technically Right accumulator charged under + 20 °C temperature must have 8V voltage after 8 hours from charging device disconnection. The performance time of such accumulator is 12-16 hours (1 measurement per minute at max indicator brightness).

Application 3. Remote control panel

The panel is used with the radar gun at stationary moving mode to increase security and comfort, to hide patrolling.

3.1 CONNECTION AND PERFORMANCE.

To connect the panel take off the safety cover from connector on the handle right side and connect the panel cable. There is no separate panel power switch. The indication on the panel changes in accordance with radar gun working modes changing. The panel indicator repeats radar gun indicator: red color – target speed, green color – patrol car speed. A and P mean working mode indication. Button "Пуск" on the panel repeats the radar gun trigger. There is time on the panel and clock. There is an opportunity of the biggest target fixing. See more information in the panel manual.

3.2 RECOMMENDATIONS.

Place the radar gun on the holder inside the car in the stationary mode. The panel cable length is 2 m, that allows an officer work outside the car.

While working during moving place the panel on the torpedo with the help of hook and loop "VELCRO" and connect it with the radar gun. It make possible to drive and control the road at the same time. Other more suitable positions are also possible.