KORUND MTV-09 PORTABLE DOCUMENTS VERIFICATION DEVICE

OPERATION MANUAL

Contents

This Operation Manual (OM) is intended for proper and safe operation of Korund MTV-09 portable documents verification device (hereinafter referred to as 'product' or 'device') and the assessment of its technical condition when considering the necessity to send it for repair. Product maintenance does not require any special training of staff.

1. PRODUCT OPERATION

1.1 Purpose

1.1.1 Korund MTV-09 portable documents verification device is intended for visual checking of documents, securities, banknotes and other sheet dielectric materials in non-stationary conditions using optical method.

1.2 Technical Characteristics (features)

1.2.1 Wavelength of ultraviolet (UV) emitter (UV-365) 365 nm.

1.2.2 Wavelength of the first infrared emitter (IR-830) 830 nm.

1.2.3 Wavelength of the second infrared emitter (IR-940) 940 nm.

1.2.4 UV radiation Power - 190 mW.

1.2.5 Resolution of video camera 480 TVL (640x480).

1.2.6 Built-in diagonal display - 2.5".

1.2.7. Working distance to the object under control in IR modes 80 ± 10 mm.

1.2.8 Working distance to the object under control in UV mode 50-80 mm.

1.2.9 The device is powered from:

- 3 AA batteries with a capacity of 2500-2700 mA * hour;
- alternating current mains through network adapter DC 5V, at least 2A.

1.2.10. Time of continuous operation of the device from fully charged regular batteries in IR-830 and IR-940 modes is at least 60 minutes.

Note - Continuous operation time from rechargeable batteries is specified for fully charged batteries with a capacity of 2500-2700 mA * h under normal climatic conditions and for rechargeable batteries with at least 3 'charge -discharge' cycles.

1.2.11 The product has the following functions and options:

- separate operation in radiation modes: IR-830, IR-940 and UV;
- the option to operate with automatic switching between IR-830 and IR-940 modes;
- UV radiation power adjustment;
- indication of UV LED temperature on the display;
- Sleep mode 7 seconds after power-on or 60 seconds after operating in the modes IR-830, IR-940 and UV;
- the option to display images onto an external monitor;
- the option to work in two video formats: PAL or NTSC;
- power mode display (from batteries or from an external network adapter);
- battery charge indication;
- automatic shutdown of the device when the batteries are discharged below critical level.

1.2.12 Time to enter operating mode after power-up no more than 5 s.

1.2.13 Overall dimensions of the device (175± 10) x (70 ± 10) x (50 ± 10) mm.

1.2.15 Weight of the device without batteries (0.35 ± 0.05) kg.

1.2.15 Climatic operating conditions of the device:

- operating temperature range from minus 0 to plus 50 ° C;
- relative air humidity of not more than 95% at a temperature of plus 25 ° C

1.3. In Box

1.3.1 Product Delivery Set is specified in Table 1.

Table 1

Name	Pcs
Korund MTV-09	1
Protective cover	1
AA Ni-Mh rechargeable batteries(2500-2700 mA*h)	6
DC 5V Network adapter, at least 2A	1
Charger for simultaneous charging of 4 AA batteries	1
Adapter cable	1
Control Test	1
Cloth	1
Hand strap (cord) for carrying	1
Data Sheet	1
Operation Manual	1
Standard packaging (plastic case)	1

Note

1. Rechargeable batteries are supplied discharged

2. Network adapter, charger, power elements, and packaging can be replaced by the ones that are similar in technical specifications.

1.3.2 The main components of the device in standard packaging are shown in Figure 1

Figure 1

Attention!

The appearance may vary depending on laying arrangement.

Components can be replaced by the ones that are similar in technical specifications.

1.4 Design and Operation

1.4.1 The main components of the device and the location of the controls are shown in figures 2-4.

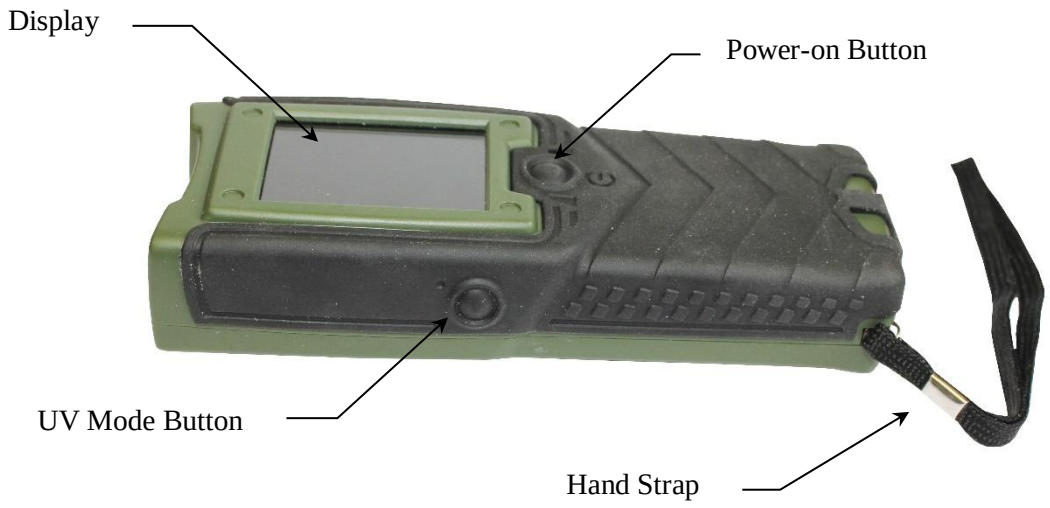

Figure 2

Figure 3

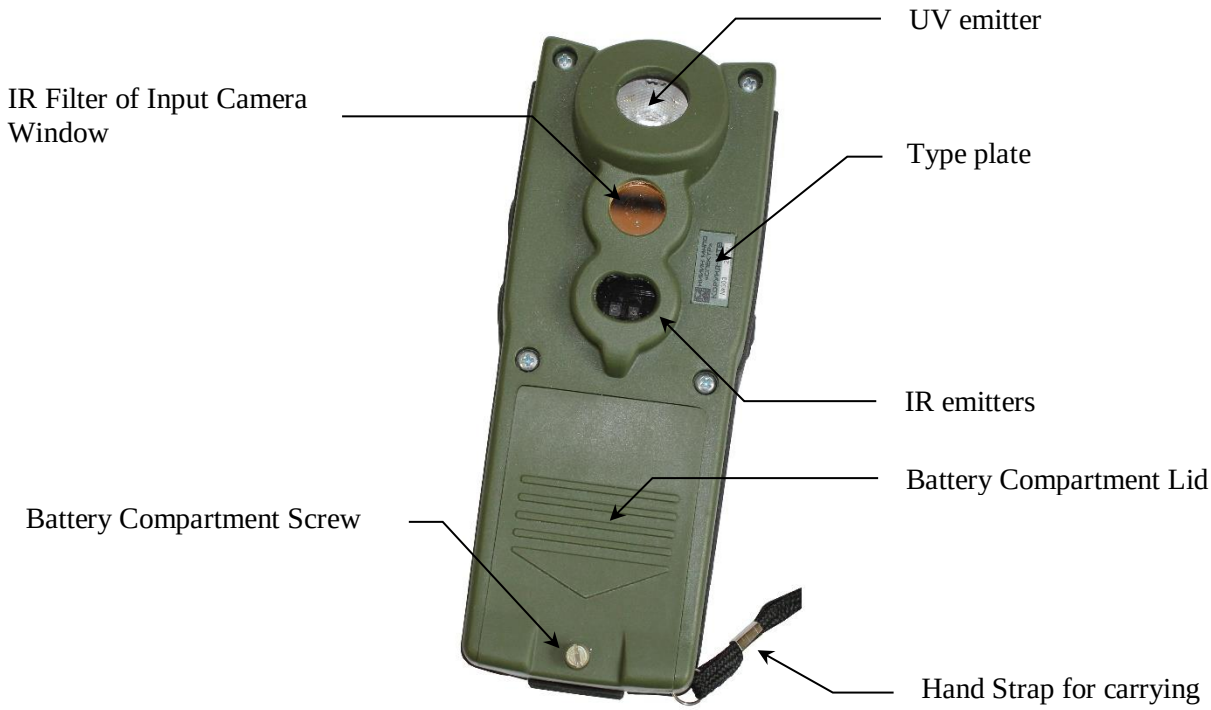

Figure 4

1.4.2 The operation of the device is controlled using power button and three function buttons located on the side panels of the device. Power button is located on the front panel of the device body under the display. The UV-365 mode button is located on the side panel of the case to the left of the display, and the IR-830 and IR-940 mode buttons are on the side panel of the case to the right of the display. In the UV-365 mode IR-830 and IR-940 buttons are used to adjust the power of ultraviolet radiation.

1.4.3 On the front panel of the case, next to the power button, there is a power and low battery indicator. Green LED indicates power is on. Short-term or constant red color of the indicator states for battery discharge below permissible level or its malfunction.

1.4.4 Battery compartment is located on the rear panel of the device. The IR-830, IR-940, and UV-365 emitters are also located there. The battery compartment is tightly closed by a cover fixed by a screw.

1.4.5 The device has a hand strap fixed to the device body or cord for comfort when wearing in hand.

1.4.6. In the lower part of the case there is a universal connector for power supply and video output. The connector on the device is closed with a protective cover. Connection to the connector is carried out using adapter cable. The connector on the adapter cable has a lock protecting against disconnection. At the output, the adapter cable has two connectors: a connector for connecting a network adapter and a video output connector.

1.5 Marking and Sealing.

1.5.1 Marking is applied on the standard packaging (plastic case) and on the product case.

1.5.2. Marking of the product, which includes short name of the manufacturer and/or the trademark of the manufacturer, name and/or code of the product, individual serial number and year of manufacture is marked on the code plate on the case of the control panel and on the package (plastic case).

1.5.2. The product is sealed (if needed) on a standard package (case). The product itself is not sealed.

1.5.3 When shipping unaccompanied, as well as during transportation over distances of more than 100 km, standard package with the product is additionally packed in a transport package (cardboard or plywood box).

1.5.4 The following handling signs and notes are applied to the transport packaging:

- Fragile. Caution, Protect from Moisture, Top, Stacking is limited to 20 kg max;

- short name and / or trademark of the manufacturer;

- name and / or code of the product, as well as other information specified in the supply contract.

1.5.5 The product is sealed on standard packaging (plastic case) or on factory cardboard packaging upon the agreement with the Customer. The product itself is not sealed.

1.6. Package

1.6.1. The product is packed in a standard package (plastic case).

1.6.2. The product in a standard package is packed in a matched transport packaging (cardboard or plywood box).

2. USING THE PRODUCT

2.1. Operational restrictions

2.1.1. Before starting, carefully read this Operation Manual

2.1.2 When operating the device, observe electrical safety rules for production non-electrical personnel of group I and the electrical safety requirements in accordance with GOST R 12.1.019-2009, GOST 12.1.038-82 and GOST 12.1.030-81.

2.1.3 When operating the device, carefully observe fire prevention rules of the Russian Federation (approved by Decree of the Government of the Russian Federation of April 25, 2012 No. 390).

2.1.4. **Do not** open battery compartment of the product, replace batteries, remove protective lid of the battery compartment and lens in the conditions of high humidity (over 90%), condensate, or the possibility of water penetration into the interior content of the product and its parts.

2.1.5 **Do not** immerse the product into water, do not power the product in case of water ingress, do not operate the product at temperatures beyond the limits specified in p. 1.2.15.

2.1.6. Do not operate the device in the UV radiation mode at temperatures of the UV emitter above 70 ° C (UV emitter temperature is on display) and when OVERHEAT appears on the display screen.

2.1.7. Replacement of battery should be carried out only when the device is powered off.

2.1.8 To prevent battery explosion, use the charger from the delivery set only for NI-MH batteries. Never charge alkaline or other primary power elements in the supplied charger.

2.1.9. Avoid simultaneous charging of batteries with different degrees of discharge, as well as of different capacities and different manufacturers.

2.1.10 **Do not** use charging device outside or inside the car.

2.1.11 Ambient temperature during charging should be in the range from plus 5ºC to plus 40ºC.

2.1.12 Do not insert leaked batteries or those with any signs of corrosion into the device or charger.

2.1.13 Rechargeable batteries can heat up during charging; after full charging, they gradually cool to room temperature.

2.1.14 Do not store batteries in the device if the break in its use is more than 3 days.

2.2. Getting Started

2.2.1. Before using the device, make sure there is no violation of operational restrictions

2.2.2. Remove the device off the standard package.

2.2.3. Make sure there is no mechanical or chemical damage on the power units. Check for any mechanical damage on the product.

2.2.4. Install rechargeable batteries into the battery compartment of the device carefully observing polarity.

2.2.5. Close battery compartment lid tight by pulling it to the case with a screw to prevent penetration of foreign objects and water into the case while operating the device.

2.2.6 Power the device by holding power button for 2-3 seconds, and check battery charge level when the device is operating from batteries. If battery indicator is green, battery charge level is adequate. If the indicator flashes or stays in red and the backlight is off, then batteries need charging. In addition, battery charge level can be estimated by the battery image on the display screen.

2.2.7 Batteries are charged on the charger of GP type. The external view of the charger is shown in figure 5.

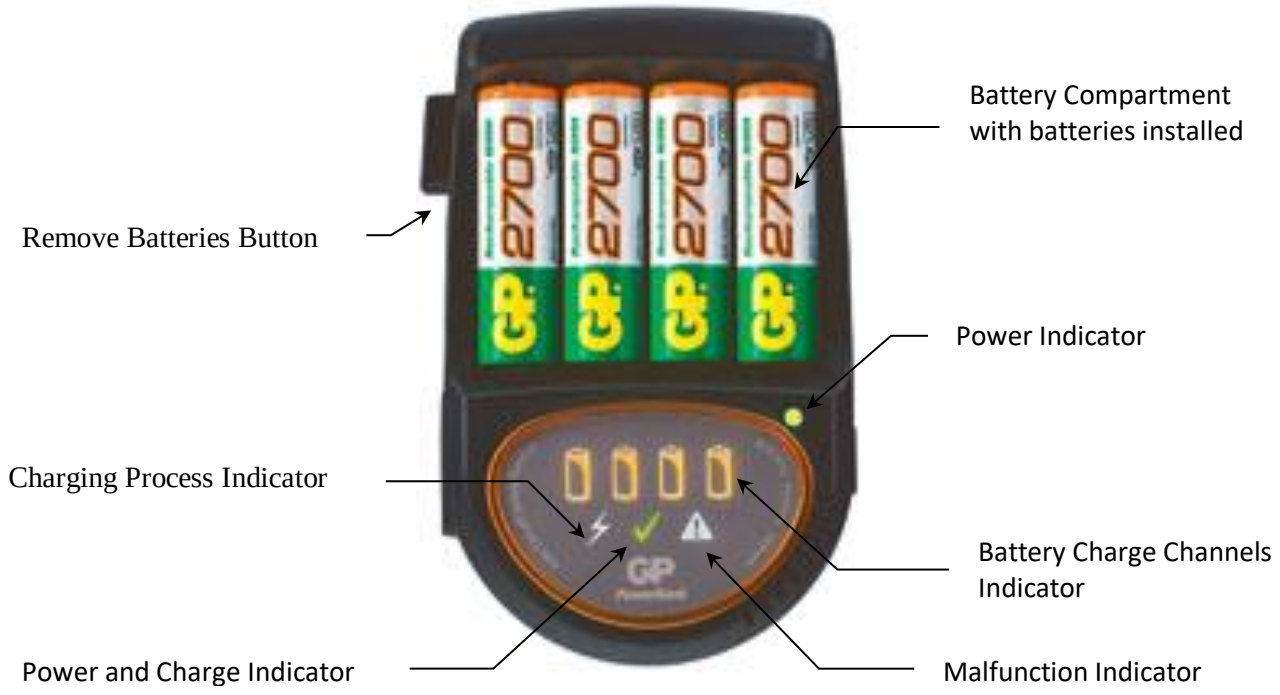

Figure 5

Attention - The charger can be replaced by the one that is similar in technical specifications.

2.2.8 To charge the batteries, follow these steps:

- connect power cord to the charger and AC 220V / 50Hz. When properly connected, the green LED will be on the charger's body;

- install the rechargeable batteries into the charger strictly in accordance with the polarity indicated on the case. During charging, opposite to the installed battery, there will be a battery charge channel indicator and the lightning icon indicating charging process. After charging has been completed, the green indicator (check mark) will be on. While this the indicators of the corresponding battery charge channels will be on continuously. If a defective battery or another type of battery is installed into the charger, the 'exclamation sign' indicator and the 'batteries' indicators will be flashing frequently. In case of a malfunction of the charger, green power indicator and the 'exclamation sign' indicator will be flashing, and the charging process will not be launched;

- after the end of charging, disconnect the charger from the 220V / 50 Hz network and remove the batteries using the button located on the side of the charger body.

2.2.9. The approximate time of simultaneous charging of 4 batteries is shown in Table 2.

Table 2

Battery Type	Capacity (mAh)	Charging time (min)
AA	2100	225
AA	2300	250
AA	2500	270
AA	2700	285

2.2.10 When the batteries are partially dis-charged, it is impossible to operate in UV mode (due to high current consumption), but it is possible to operate in IR-830 and IR-940 modes (low current consumption).

2.2.11 To operate the device from network adapter, connect the adapter cable connector to the power and video output connector located behind the hinged protective cover at the end of the case. After this, connect network adapter to the adapter cable and then to the 220V / 50Hz network. After connecting network adapter, the device goes into external power mode and the 'plug' icon is displayed.

Attention! Adapter cable connector is connected to the device with the HRS marking up from the display side. To disconnect the connector, press the side lamellas of the connector and pull it.

2.2.12 Before using the device, it is recommended to check its operability with the help of a control test (see Appendix).

2.3 Using the Product

2.3.1 Use the device as intended in the following order

2.3.1.1 Turn on the device by holding power button for 2-3 seconds (Figure 2). During loading, there will be a screen saver on display. The 'plug'  icon is displayed in the upper left corner of the display if the device is operating from a net-work adapter or 'batteries'  icon if powered by batteries (Figure 6). After loading has been completed, video camera is enabled automatically.

Figure 6

2.3.1.2 To switch to IR-830 mode, press IR-830 mode button (Figure 3). There are images of a 100-ruble note as an example. After pressing the button, infrared emitter of this mode will be enabled and **IR-830** will be on the display of the device (Figure 7). Pressing the button again will turn off infrared emitter mode. The working distance to the control object in infrared modes is 80 ± 10 mm. To adjust image clarity on display, gently move or remove the device from the control object, achieving the best sharpness.

Figure 7

2.3.1.3 To switch to IR-940 mode, press IR-940 mode button (Figure 3). After pressing the but-ton, infrared emitter of this mode will be enabled and IR-940 will be on the display of the device (Figure 8). Pressing the button again will turn off infrared mode emitter.

Figure 8

2.3.1.4 To check M-tag, press IR-830 and IR-940 power buttons simultaneously (Figure 3). After pressing the buttons, the infrared emitters of the device will turn on alternately. The display will read alternately IR-830 and IR-940. To exit the mode, press one of the **IR-830** or **IR-940** mode buttons.

2.3.1.5 To switch to UV mode, press UV mode button (Figure 2). After pressing the button, there will appear a configuration menu for ultra-violet radiation and the numerical temperature value of the UV radiation source (Figure 9). Press IR-830 button to increase power or IR-940 to decrease radiation power. After UV emitter has been enabled, hold the device at a distance of (50-80) mm from the test object for visual inspection. For the best control result in ultraviolet range, reduce ambient light level.

*UV Brightness

Figure 9

2.3.1.6 When operating in UV mode, it is forbid-den to exceed heating temperature of UV radiation source by a value exceeding 70 ° C. If the temperature exceeds critical level, OVERHEAT appears on the screen (Figure 10) and the UV emitter automatically turns off. To continue operating in UV mode, let the radiator of the UV emitter cool down.

*Overheat

*UV Brightness

Figure 10

2.3.1.7 The 'batteries' indicator, located in the upper left corner of the display, shows relative charge level of the batteries. When a critical battery voltage level is achieved, the device automatically turns off. In order to charge the batteries, it is necessary to turn off the device, remove the batteries from the battery compartment and charge them, as specified above.

2.3.1.8 The device has the function of sleep mode. The device automatically goes into sleep mode 7 seconds after power on or after 60 seconds in IR-830, IR-940 or UV modes.

2.3.1.9 To select the PAL or NTSC video signal format, simultaneously press the IR-940 and UV mode buttons. After switching, there will be a message PAL or NTSC of the current video signal format on the display in the lower left corner (Figure 11). To display image of the object under inspection in IR-830 or IR-940 modes, it is recommended to use NTSC video signal format, since PAL format will cut off the edges of the image on display. The default video format is NTSC.

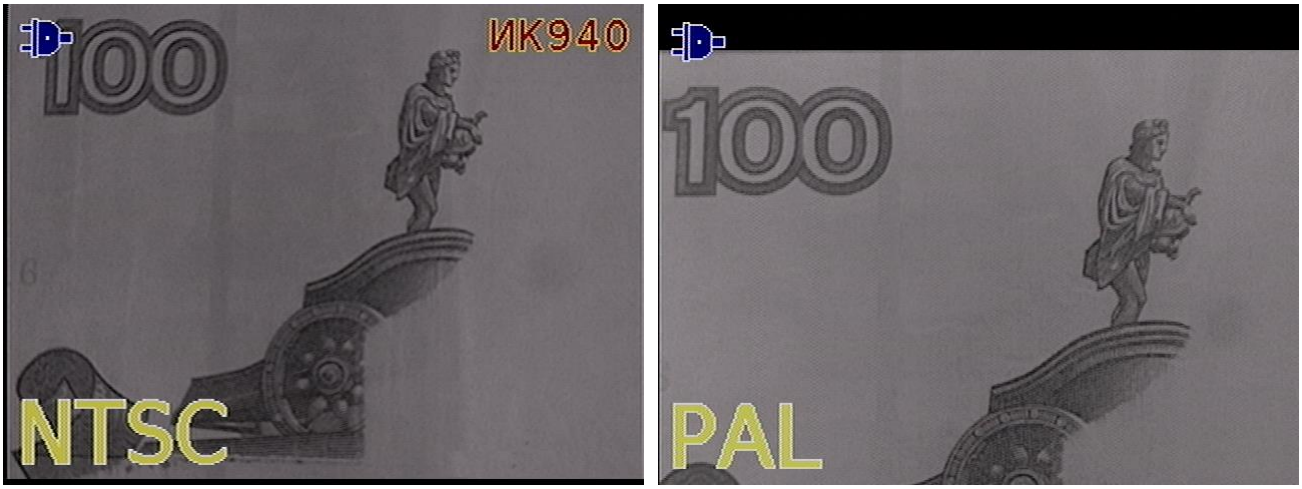

Figure 11

2.3.1.10 To output video to an external monitor, connect adapter cable to the device. After that, connect the RCA type connector on the adapter cable to the external device.

2.4. Operation in extreme conditions

2.4.1. In case of fire on the device, power off the device and take measures to put out fire.

2.4.2. In case of emergency operating conditions (high temperature, humidity, vibration, etc.), take measures to reduce the impact of emergency factors on the product.

3. TECHNICAL MAINTENANCE OF THE PRODUCT

3.1. Product maintenance does not require special training of staff

3.2. Any oxidation and salt presence on the surfaces of the batteries must be avoided. When any appear, the batteries must be replaced.

3.3. Optical surfaces of the device (eye-piece, output window) when dirty should be cleaned only with a clean cloth made of genuine or microfiber suede, designed for cleaning optical parts (eg glasses). Before that blow away the grains of sand and dust. To remove heavy grease, use a cotton swab moistened in ethanol, having preliminary removed solids from the optics with a soft brush.

3.4. Product functional testing and its technical inspection is controlled by checking para-graphs 1.2.12.

3.5. Preservation (degreasing, reconservation) of the product is carried out by packing it in its standard package (cover).

4. PRODUCT MINOR REPAIR

4.1. Minor repair of the product is carried in accordance with Table 3.

Table 3

Failure and damage consequences	Possible Reasons	Troubleshooting
No image on display when pressing power button	Rechargeable batteries are discharged Battery capacity is exhausted Contacts in battery compartment have been oxidized	Charge the rechargeable batteries Replace the batteries Clean contacts in battery compartment
No IR or UV emission	LED emitters are out of order or have been exhausted	Replace LEDs

4.2. Product repair that goes beyond minor repair, in accordance with p. 4.1 is carried out by the manufacturer.

5. STORAGE

5.1. Storage conditions.

5.1.1. The device must be stored packed (plastic case) on the shelves in the capital heated rooms at temperature from 5 ° C to + 40 ° C and a relative humidity of 80% at temperature of +25 ° C at no vapors of acids, alkalis, current-conducting dust and other chemically active substances, gases that cause corrosion and destroy insulation. It can be stored in a standard package when stacked (horizontally) on the shelves with up to 5 products. Stacking in a vertical position is not allowed.

5.2. Storage life

5.2.1. Storage life of the product in a standard package is 1 year (without rechargeable batteries) in heated ventilated premises at ambient temperature from + 50C to + 400C and a relative humidity of up to 80% at temperature of 25 ° C.

5.3. Terms of placing the product in storage and with-drawing it from storage.

5.3.1. When placing the product for storage, pack it in standard package and place on the corresponding cells. When withdrawing it from storage, the components of the product should be removed from the package and kept under standard climatic conditions for at least 12 hours.

6. TRANSPORTATION

6.1. Requirements for transportation and transportation conditions.

6.1.1. Transportation of the device is carried out in a transport container by all kinds of goods and passenger transport at a height of up to 12,000 meters and distance up to 12000 m at ambient temperatures from -40 ° C to + 60 ° C and protected against direct exposure of precipitation and reactive components.

6.1.2 After transportation and before using, keep the product in standard climatic conditions for at least 12 hours.

6.2. The procedure to prepare the product for transportation and methods of attachment during transportation.

6.2.1. When shipping unaccompanied, as well as during transportation over distances of more than 100 km, the standard packaging with the product must additionally be packed in transport packaging (cardboard or plywood box).

6.2.2 Products in transport containers should be secured in such a way as to ensure the stability of their position, excluding mutual displacement and strokes. During loading, unloading and transporting, the requirements of handling marks on the shipping container must be strictly observed.

7. DISPOSAL

7.1 Product disposal must comply with environ-mental standards.

7.2 The batteries used in the product, after the end of life (or failure), must be disposed at a specialized enterprise in the prescribed manner.

7.3. Arrangements for preparation and shipment of the product for recycling include disassembly, disassembly into components and parts with homogeneous materials.

7.4. Materials are sent for recycling in the order established by the consumer.

Appendix A

(informative)

CONTROL TEST

1 The control test is designed to test the performance of forensic devices and for training opera-tors. Figure A.1 shows test appearance.

Figure A.1

Attention!

The appearance of the control test may vary depending on the version.

2 Under the exposure of UV radiation with a wavelength of 365 nm (Figure A.2), luminescent elements can be observed in the test. Luminescence is the ability of substances to emit excess absorbed energy in the form of a quantum of light of a certain energy. In the area of 365 nm, a red rectangle appears with the message '**365 nm**', in the area of **UV**, the address block of the enterprise glows in bright red.

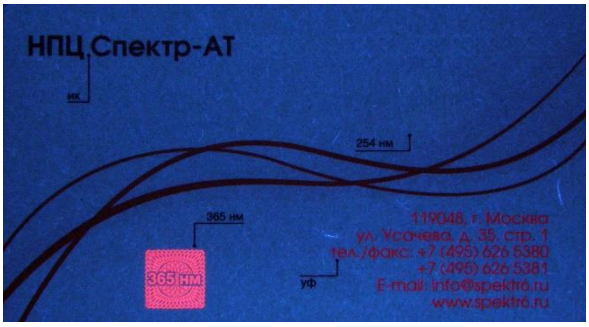

Figure A.2

3 The short name of the organization, located in the upper left corner of the control test, is printed using special metameric inks that exhibit contrasting properties with respect to infrared radiation. Some paints are transparent, others are opaque. Under the influence of direct IR radiation (Figure A.3), part of the short name of the manufacturer, namely **SPECTR-AT**, disappears.

Figure A.3

4 Under the influence of oblique IR radiation (Figure A.4), the image of embossing on the control test in the form of wavy lines becomes more noticeable ('convex'). This type of protection is often used in the manufacture of banknotes. In direct visible UV and IR radiation this protection is invisible.

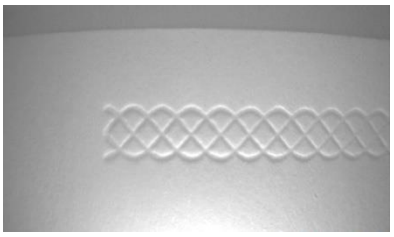

Figure A.4

5 For reference (it is not applied in Korund MTV-09 device), Figure A.5 shows the image of infra-red luminescence on the control test, for which the control test is irradiated in the range of 430-530 nm, and re-emission is fixed in the range of 700-1000 nm.

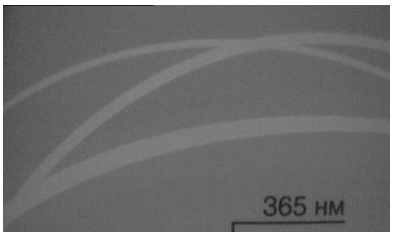

Figure A.5

6 Also for reference (it is not used in Korund MTV-09 device), Figure A.6 shows the image of a protective mark on the control test located near 254 nm line, which appears under the influence of UV radiation with wavelength of 254 nm. Ad-dress block and 365 nm mark will also luminesce.

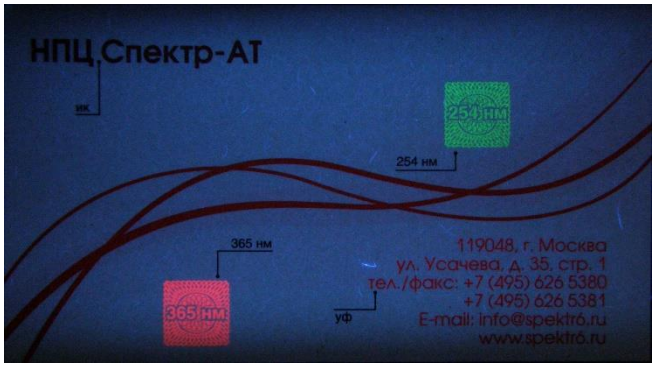

Figure A.6