Inspection Television System
POCAM-TV

Operating manual

CONTENT

This Operation Manual (OM) is intended for proper and safe operation of POCAM-TV (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. DESCRIPTION AND PRINCIPLE OF OPERATION

1.1. Area of application

1.1.1. POCAM-TV inspection TV system is designed to inspect hard-to-reach places in premises, vehicles, cargo and other facilities; operating in moderate climate conditions both outdoors and indoors.

1.2. Technical parameters

1.2.1. Adjustment range of the product's length:
- minimum length of the product up to 1200 ± 50 mm
- maximum length of the product at least 4000 ± 50 mm.

1.2.2. Rotation angle of video camera in one plane at least ± 120º.
1.2.3. TV channel has the following specifications:
- 640x480 screen resolution, display diagonal 5.6 ";
- sensitivity of camera at least 5 V/lx (wavelength 550 nm);
- camera resolution 640x480 pixels;
- S / N ratio at least 39 dB;
- focal length of base camera lens 8 ± 1 mm;
- field of view of video camera with base lens (25 °x19 °) ± 10%.
- wavelength of LED IR lightening 940 nm;
- intensity of IR lightening at least 20 mW/sr;
- angle of half brightness of IR lightening ± 15 °.

1.2.4. SD memory card capacity up to 2 GB.
1.2.5. Power voltage from 6 to 8.4 V.
1.2.6. Power supply from 4 Li-ion batteries of size 18650, each battery capacity 2600 mA/h.
1.2.7. Continuous operation from a fully charged battery with nominal capacity of 2600 mA/h in normal climatic conditions at least 3 hours.
1.2.8 Special functions and settings
- setting LED brightness;
- setting brightness and contrast of display;
- viewing photos and videos with stop on display;
- viewing frames forward and backward;
- recording photo and video onto the memory card;
- removing unnecessary entries;
- battery discharge indication.

1.2.9. Time to enable operation mode after switching is up to 5 seconds.
1.2.10. Dimensions of the device with the folded telescopic rode and display in operating position, up to (1200±50)x(325±10)x(270±10) mm.

1.2.11. Overall dimensions of the standard package (coffer) up to 1300x340x150mm
1.2.12. Weight of the device with regular batteries, up to 4.3 kg.
1.2.13. Product weight in standard package up to 9 kg.
1.2.14. Ingress protection from dust and water IP65.
1.2.15. Climatic conditions:
- Relative humidity of 95% at a temperature of 25 °C;
- Operating temperature range from -10 °C to + 50 °C.

1.3. Delivery Set

1.3.1. Product Delivery Set is specified in Table 1.

Table 1

Name	Pcs	Note
POCAM-TV	1	
Li-ion rechargeable batteries (size 18650, capacity 3100 mA/h)	6	
Battery charger for simultaneous charging of 4 batteries	1	
Charger adapter	1	
Cable for battery charging from cigar socket	1	
Cloth for cleaning optics	1	
Operation manual	1	
Standard transport package (coffer)	1	

Note: The charger and the rechargeable batteries can be replaced by similar according to their technical specifications.

1.4. Principal of operation

1.4.1. The main components of the device and the control layout are shown in Figure 1.

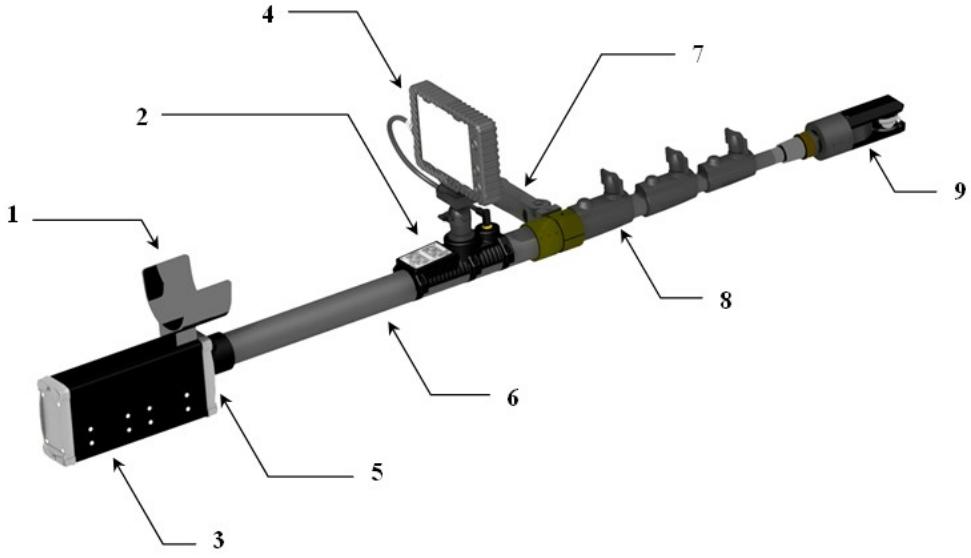

Figure 1.

1. Armrest
2. Keyboard unit
3. Battery compartment
4. Display
5. Power button
6. Telescopic rod
7. Side stick
8. Collets
9. Rotator with video camera

1.4.2. Figure 2 shows the location and functionality of the buttons on the keyboard unit. There are also two LEDs indicating IR lightening on the front panel of the keyboard.

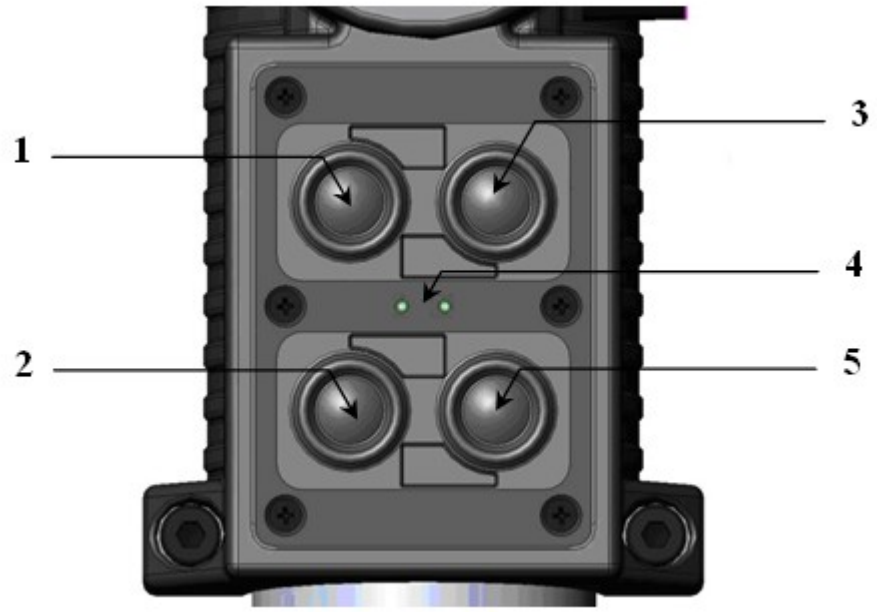

Figure 2.

1. Save frame button
2. Camera rotation to the left
3. Setting brightness of IR lightening
4. Indicators of IR lightening
5. Camera rotation to the right

1.4.3. Figure 3 shows the location and functionality of the buttons on the front panel of the keyboard.

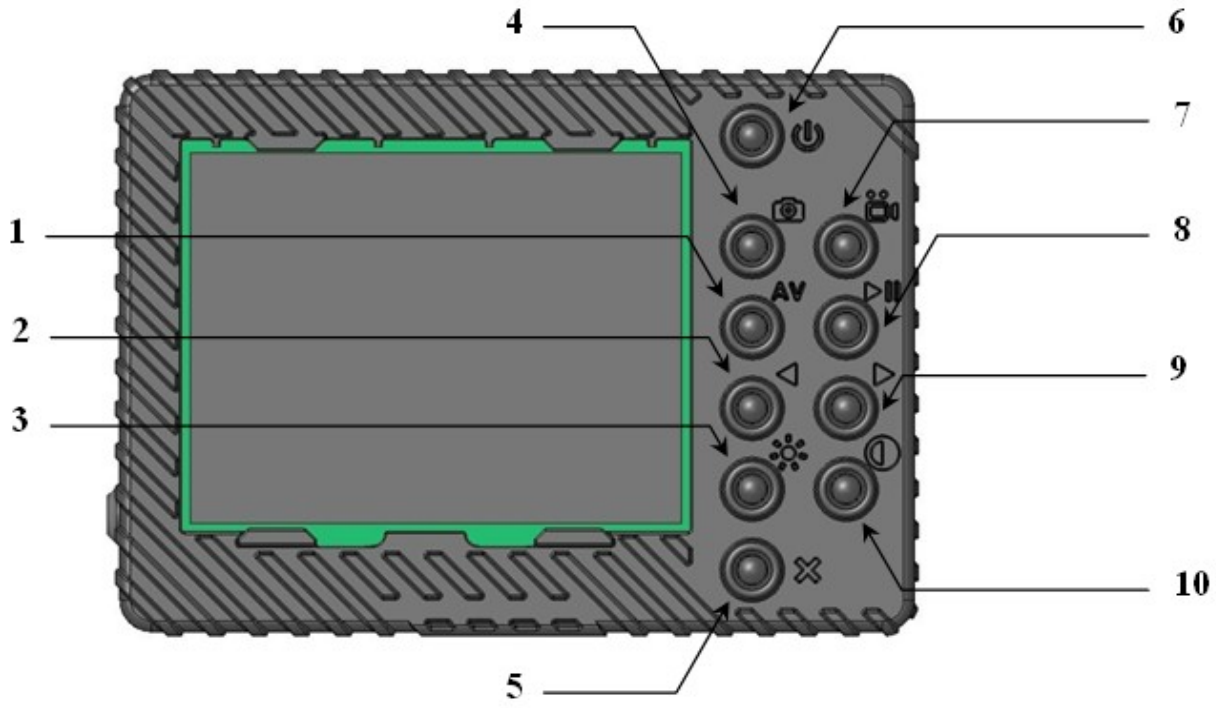

Figure 3.

1. View Mode
2. Frame backward
3. Setting brightness
4. Save frame
5. Erase
6. Power ON
7. Save Video
8. View-Stop
9. Frame forward
10. Setting contrast

1.4.4. Buttons on the keyboard unit (position 2, Figure 1) are used to rotate the camera on a rotator to the left and right, to adjust the brightness of IR lightening, save snapshots. Also there are two LEDs on the keyboard unit indicating IR lightening.
1.4.5. The buttons on the display (position 4, Figure 1) are used to power on / off the display, record photos and videos, view the recorded files with the option to stop viewing, play frames back and forth, as well as to adjust brightness and contrast, and to remove unnecessary information.
1.4.6. There is a slot in the display's case for memory cards of the SD type.
1.4.7. To power on / off the device, press the button (position 5, Figure 1). Next to the power button, there is a three-color LED indicator of battery discharge. Red color indicates battery discharge, green color states for a full charge, and the yellow one for the intermediate value of battery charge.
1.4.8. Telescopic rod sections are made of glass-carbon fiber.
1.4.9. The display is mounted on a telescopic rod using quick-fixing.

1.5. Marking

1.5.1. Marking of the product, which includes short name of the manufacturer or a trademark of the manufacturer, part number, individual serial number and year of manufacture is marked on the code plate on the case of the device and on the package (coffer). The product in its standard package is packed in a cardboard box. The markings on the cardboard package of the product may contain, in addition to the above markings, other information specified in the supply contract.
1.5.2. The product is sealed on a standard package (coffer). The product itself is not sealed.

1.6. Packing

1.6.1. The product is packed in a standard package (coffer).
1.6.2. The product in a standard package is packed in a matched transport packaging (cardboard box). Sealing and unsealing of the product is carried out by the representative of the QC department.

2. PROPER USE

2.1. Operational restrictions

2.1.1. Before starting, carefully read this Operation Manual.
2.1.2. When finished, power off the device to prevent battery discharge during transportation and storage.
2.1.3. **It is prohibited** to open battery compartment of the product, replace batteries, remove protective lid of the battery compartment 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.
2.1.4. **It is prohibited** to immerse the product into water, do not power the product in case of water ingress, and do not operate the product at temperatures beyond the limits specified in p. 1.2.15.
2.1.5 Replacement of battery should be carried out only when the device is powered off.
2.1.6. **It is prohibited** to use the charger to charge other types of rechargeable batteries, except for Li-ion. Charging any other types of rechargeable batteries may cause them and charger damage and fire up to the explosion.
2.1.7. Do not mix in the charger depleted and new rechargeable batteries as well as batteries with varying degrees of charge. Ignoring this rule may cause explosion.
2.1.8. Use the charger only in dry locations. Protect the charger from rain, snow or excessive moisture. Do not use the charger if it is damaged.
2.1.9. **Do not block** the ventilation holes on the bottom of the charger. Do not place the device on porous surfaces (carpets, rugs and blankets) or soft upholstery (upholstered furniture, car seats).
2.1.10. **It is prohibited** to leave a powered charger unattended.
2.1.11. Do not leave batteries in the charger for a long time after the end of charge.
2.1.12. Recommended temperature for charging batteries is from +15 °C to +40 °C

2.2. Getting Started

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

2.2.2. Unpack the device.

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

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

2.2.5. Close battery compartment lid tight to prevent penetration of foreign objects and water into the case while operating the device.

2.2.6 Mount the display onto the device. Connect video cable of the display to the connector on the device.

2.2.7 Power the device and display, and check on the battery charge indicator, that the rechargeable batteries are fully charged (green LED). If the rechargeable batteries are discharged, the LED won't light up, or there will be red LED on. In this case, charge the rechargeable battery. If the indicator is yellow, it means, the rechargeable batteries have not been fully charged. That reduces time of continuous operation with the device.

2.2.8. If the batteries are discharged, charge them in the following order:

- install the batteries into the charger. If necessary, move the spring ("-") contact. The spring fixes the contact on the battery. The polarity of installing the batteries is specified on the charger;
- plug in mains power adapter to 220V / 50Hz network or a cigarette lighter cable to the cigarette socket of your car. Plug the adapter cable or cigarette lighter cable to the charger;
- After powered on, the charger will check the serviceability of channels. At this point, 4 indicator LEDs will be red, then green;
-charging process starts. Channel indicators with rechargeable batteries will be red. If the indicator does not light red, install the battery once again - perhaps there was an incorrect contact.
-80-90% of charge make the indicator flash green, indicating charging process is almost finished.
-after the battery has been charged, the indicator is permanently green. Remove the rechargeable batteries from the charger and unplug the adapter from the mains or disconnect the cable connector from the cigarette socket of the car;
- when installing faulty or unsupported (eg Ni-Mh, Ni-Cd, etc.) rechargeable batteries, charging will not start (and if started, then immediately ends), and the indicator will change color from green to red and back;
- in case of wrong polarity, battery indicator will not be on.

2.2.9. Approximate charging time from a regular charger is specified in Table 2.

Table 2

Channel №	Rechargeable battery size	Capacity mA/h	Charging time, hours
I, II, III, IV	18650	1800	1,8
		2000	2,0
		2200	2,2
		2800	2,6

2.2.10. While operating current state of the battery is displayed as a graphic symbol of battery image in the upper right corner of the screen. The emptier the battery is, the less shaded segments battery symbol has. When battery depleted, the device is switched off automatically.

2.3. Product use

2.3.1. Loosen the collets on the product and set the desired length for the telescopic rod. Secure the collets.
2.3.2. Power the device. Switch on the display.
2.3.3. Direct the camera to the inspected object.
2.3.4. Set display brightness and image contrast.
2.3.5. If necessary, enable IR lightening.
2.3.6. By moving the telescopic rod and controlling the position of video cameras, observe and if necessary save the resulting image onto the memory card.
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. MAINTENANCE SERVICE

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. Lens of video camera when dirty should be cleaned only with a clean cloth made of genuine or microfiber suede, designed for cleaning optical parts (e.g. 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. Wipe the display using special display cleansing agents.
3.4. Product functional testing and its technical inspection are controlled by checking paragraphs 1.2.1., 1.2.2., 1.2.8., 1.2.9.
3.5. Preservation (degreasing, reconservation) of the product is carried out by packing it in its standard package (plastic case).

4. REPAIR

4.1. Minor repair of the product is carried in accordance with Table 2.

Table 2

Failure and damage consequences	Possible Reasons	Troubleshooting
When powered, there is no image on display.	Battery capacity is exhausted. Rechargeable batteries are discharged. Contacts in battery compartment have been oxidized. Video cable connector incorrectly inserted.	Replace the batteries. Charge the rechargeable batteries. Clean contacts in battery compartment. Check the connection of video cable.
Hindered rotation of video camera in rotator.	Contamination or mechanical obstacle in the rotator.	Eliminate contamination or mechanical obstacle.

5. STORAGE

5.1. Storage conditions.

5.1.1. The device must be stored packed 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 or in unheated rooms at temperature from - 40°C to + 60°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 4 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 +5°C to +40°C and a relative humidity of up to 80% at temperature of 25 °C.

5.3. Terms of placing the product in storage and withdrawing 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 at ambient temperatures from -40 °C to +60 °C and protected against direct exposure of precipitation and reactive components. When carried in railway wagons, the shipment should be small low-tonnage. 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. Before transporting the product in a standard package, it can be packed into an extra matched shipping container (carton or plywood box). 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.

6.3. Transport characteristics of the product.

6.3.1. Dimensions of the product in standard package (coffer) up to 1400x500x300 mm.

6.3.1. Product weight in standard package (case) up to 6 kg.

6.4 Warranty

6.4.1. The manufacturer guarantees that the product conforms to the technical requirements for 12 months from the date of commissioning, but not more than 18 months from the date of shipment to the Customer (including storage and transport) provided the rules of maintenance, transportation and storage have been observed.

6.4.2. Warranty period of storage - 6 months.

6.4.3. Operating lifetime - 7 years.