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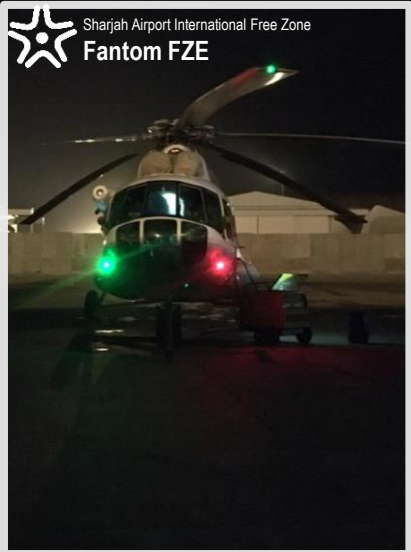
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NVG COMPATIBLE LIGHTING EQUIPMENT FOR MI-17 CIVIL HELICOPTERS

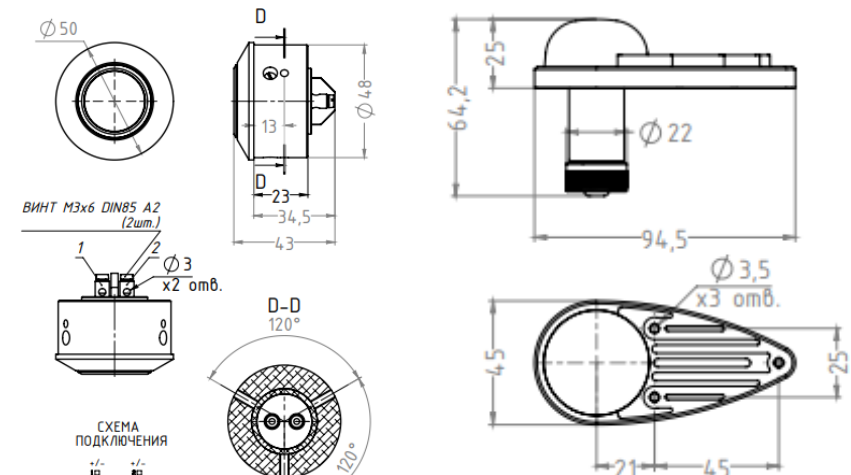
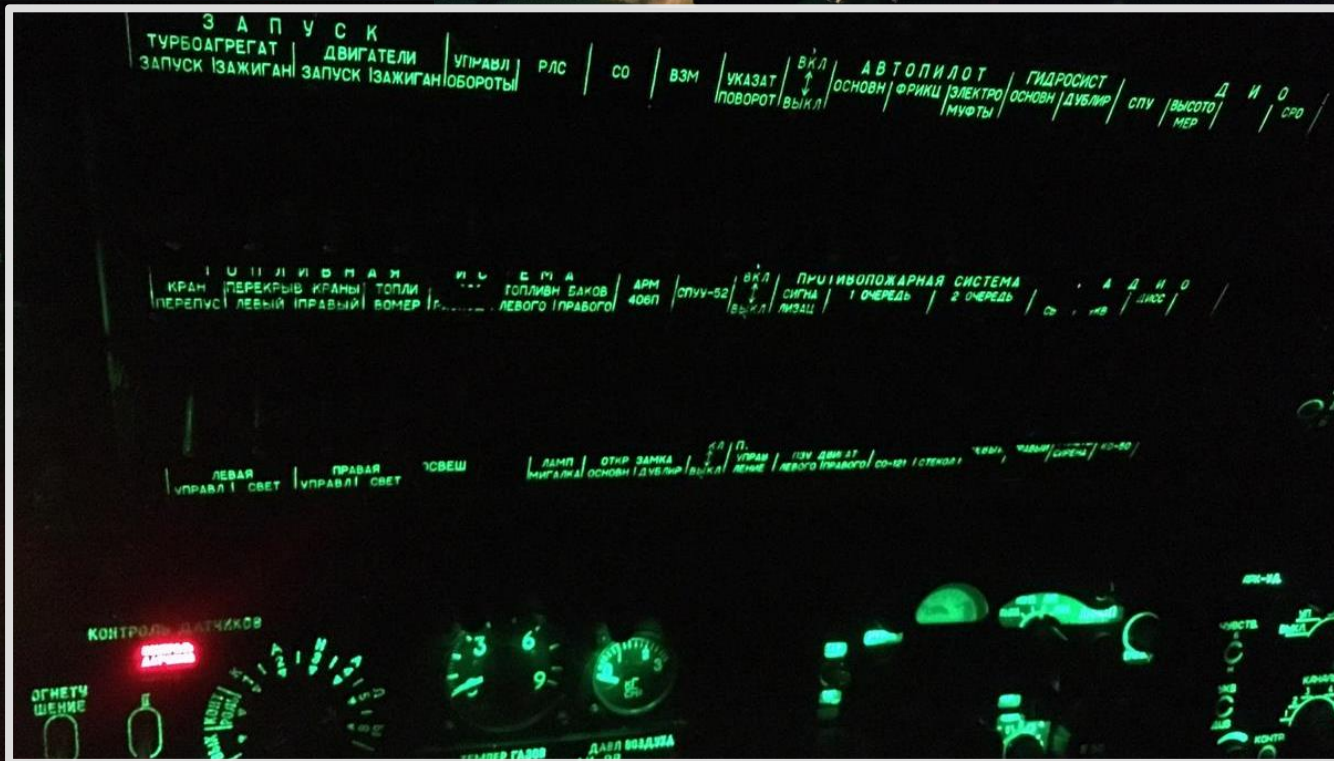
COMPLIANT WITH:
MIL-STD 3009 / DO-275, EASA (CS29), FAA (AC 29-2C)



DEVELOPMENT OF LIGHTING EQUIPMENT COMPATIBLE WITH NIGHT VISION GOOGLES

Lighting equipment for helicopters of types Mi-8, Mi-8MTV, Mi-171, Mi-24, adapted for use with NVG is developed under Part-21 requirements, according to MIL STD-3009

Equipment is tested according DO-160 qualification requirements (vibration, temperature, moisture, altitude, EMC, electrostatic discharge, sand and dust etc.).

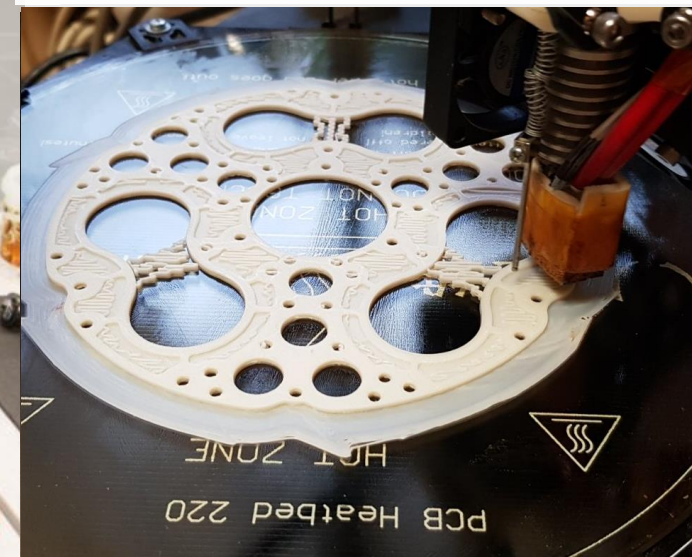




PRODUCTION OF LIGHTING EQUIPMENT ADAPTED FOR THE USE OF NVG

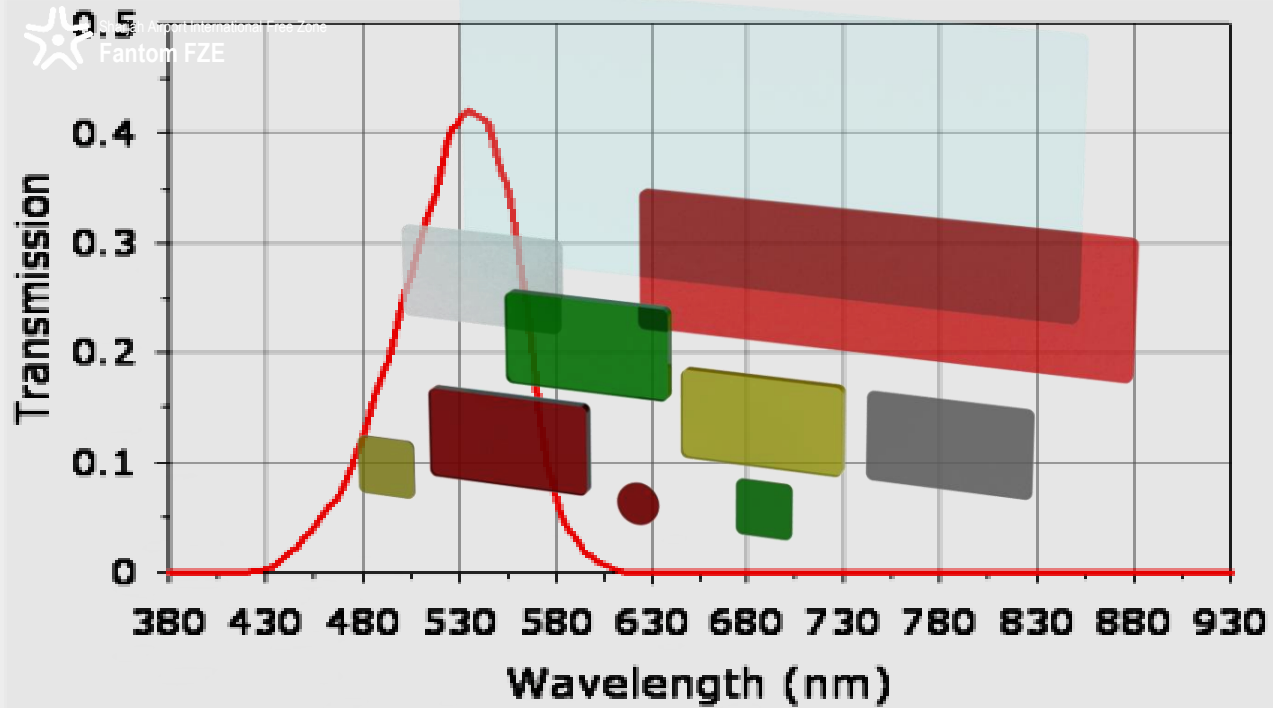
The sets of equipment for adaptation of external and internal lighting equipment based on additive technologies and modern specialized equipment use components and materials from the world's leading manufacturers, taking into account the specifics of their aviation use.

All electrical equipment has electromagnetic compatibility with onboard equipment.





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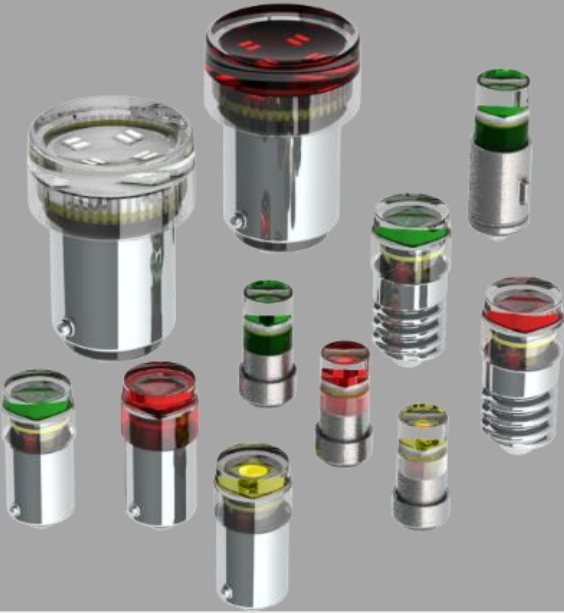
NVIS-COMPATIBLE LIGHT FILTERS

To ensure the compatibility of LEDs with the NVG, and compliance with the requirements of MIL-STD-3009, specialized NVIS filters are used.

The complete delivery set of helicopter type Mi-17 adapted lighting equipment includes full range of optical light filters necessary for the adaptation of light panels, point indicators, avionics displays and illuminated buttons.

- Strong and durable certified materials manufactured in the USA and Japan.
- Anti-reflective, abrasion-resistant and UV-resistant coating on external panel and displays glasses.
- Uniform glow and high contrast of the panels inscriptions due to the use of special diffusers, legends and light sources.





NVIS-COMPATIBLE LED LAMPS

Applicable LED light sources are fully compatible with the NVG and can be installed in standard fixtures.

The delivery lighting equipment kit for Mi-17 helicopter includes about 500pcs LED lamps of various colors and sizes required for the adaptation of light panels, consoles and instrument panels, indicators and dome lights.



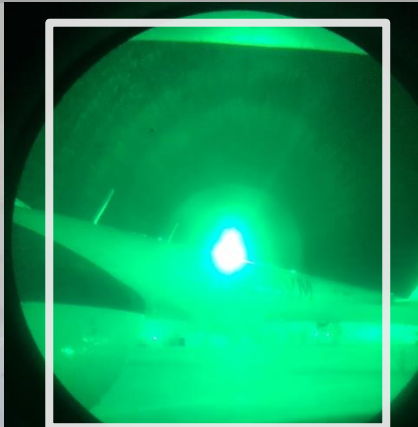
- Due to the high efficiency of the LEDs, the lamps remain cold during long-life extended operation.
- The NVIS-integrated light filter absorbs the parasitic infrared component of the spectrum of monochrome LEDs.
- A special optically transparent protective cover with a wide operating temperature range from -55C to + 100C reliably protects the LED components.
- The overall reduction in energy consumption of the helicopter due to the use of LEDs instead of incandescent lamps is about 1.5 kW of power.



NAVIGATION LIGHTS

left and right “BANO”, tail “ANO” and lighting control system

- Lightweight and durable, anti-vandal design, hard-anodized duralumin case, polycarbonate cover, reliable LEDs and specialized sealing compounds.
- The direction, color and luminous flux meet the requirements of international norms of airworthiness and safety.
- The functional design and light characteristics of the lights meet the requirements of the standard MIL-STD-3009.
- The dual-mode light emitting (visible / infrared) for covert operations is available.



All equipment is installed in the standard mounting places of the helicopter, without any fuselage modifications.





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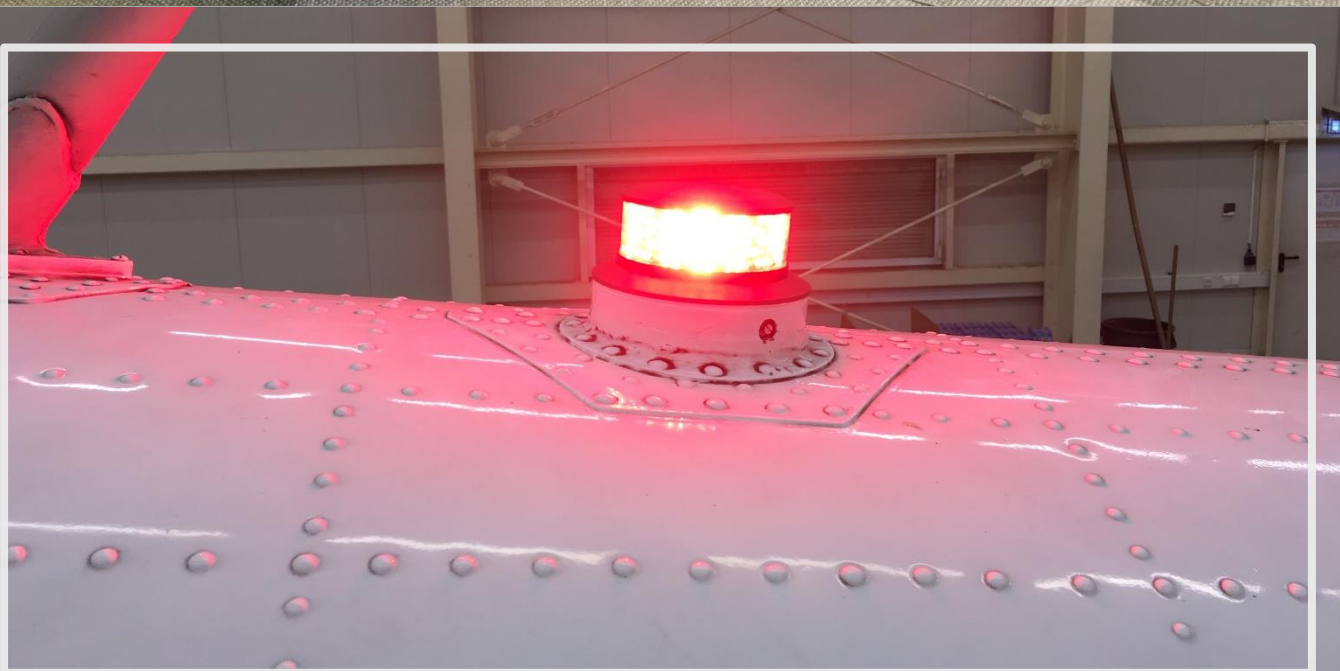




FLASHING BEACON

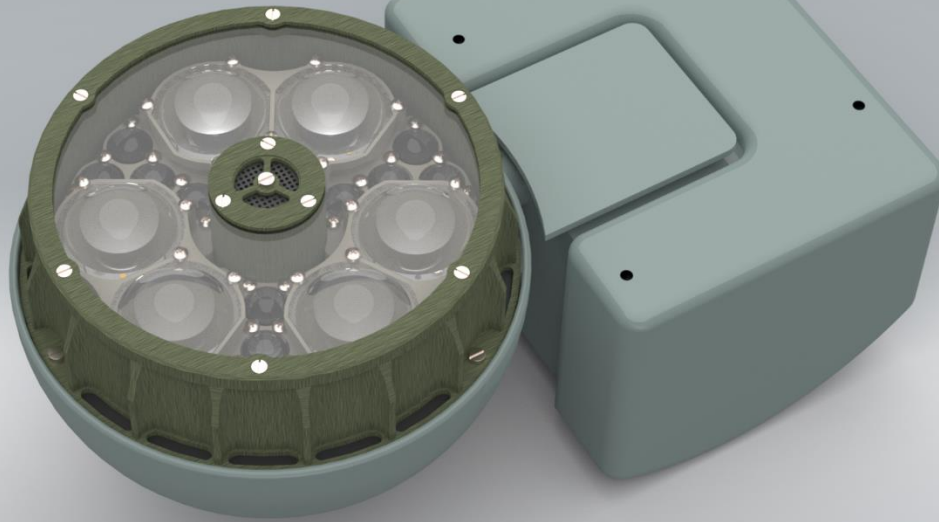
Beacon control system

- Bright aviation red color (>150cd of light intensity).
- Safe and compatible with the NVG - Aviation red / hidden IR modes of operation.
- Made of durable materials, 4-times power backup.
- Maintenance-free.
- There are several modes of the beacon operation - imitation of lamp rotation / strobe / adjustable frequency of flashes (MIL-STD-3009).

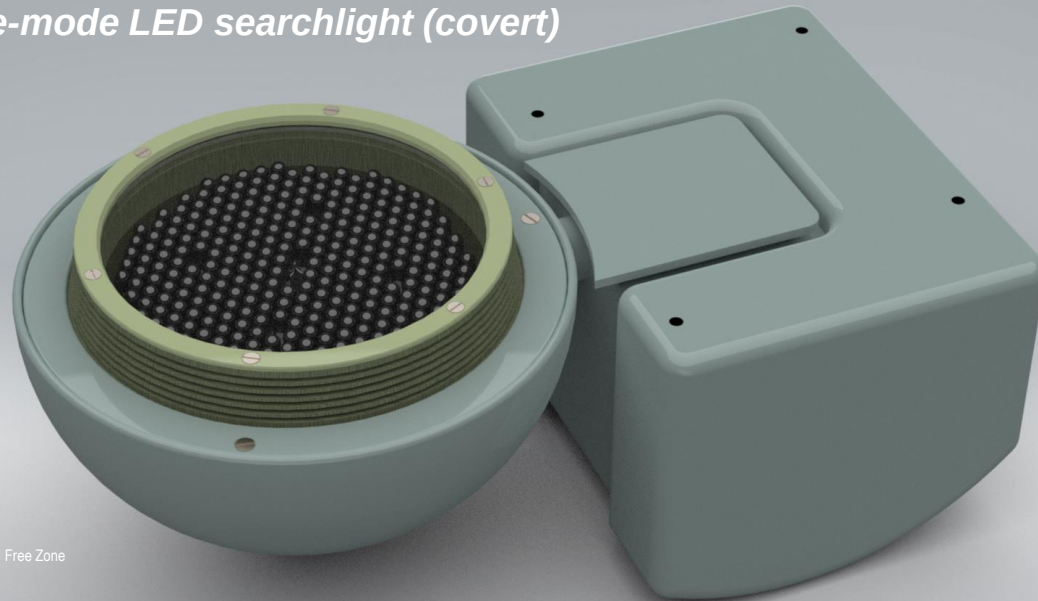


Selecting of flash patterns is available.

Dual-mode LED searchlight (visible / covert)



Single-mode LED searchlight (covert)



LANDING, SEARCHING AND TAXI LIGHT

- Left and right LED lamps of white and IR radiation spectrum for searchlight FPP-7. Provide sufficient visibility of ground objects in the NVG at a height of up to 200 m. IR lamp also provides 100% stealth for the naked eye.
- Also available cost-effective optional IR-filter for a regular incandescent lamp. The light filter ensures the transmission of light from the incandescent lamp in the range from 800 nm, in the zone of sensitivity of the III generation and above NVG.
- LED lamp of the taxi light type FR-100, white spectrum, provides sufficient visibility of objects on the ground during taxiing, much more efficient than a regular incandescent lamp.
- The IR version of the lamp for the light type FR-100 is available.

Various variants of the adapted lights of type FPP-7 are possible



FORMATION AND BLADE TIP LIGHTS

- LED lamps of formation flight lights operating compatible with the NVG in visible yellow (MIL-STD-3009 optional green), as well as the "hidden" IR mode, include regulator of the radiation modes of the group of formation lights in the "NVG" mode
- LED lamps in the tip of the main rotor blades, operating in a visible green compatible with the NVG and "hidden" infrared radiation ranges. The system also includes a regulator of brightness.

- ***Reliable and maintenance-free - a designated service life of 8 years.***
- ***The equipment is installed on the standard places.***

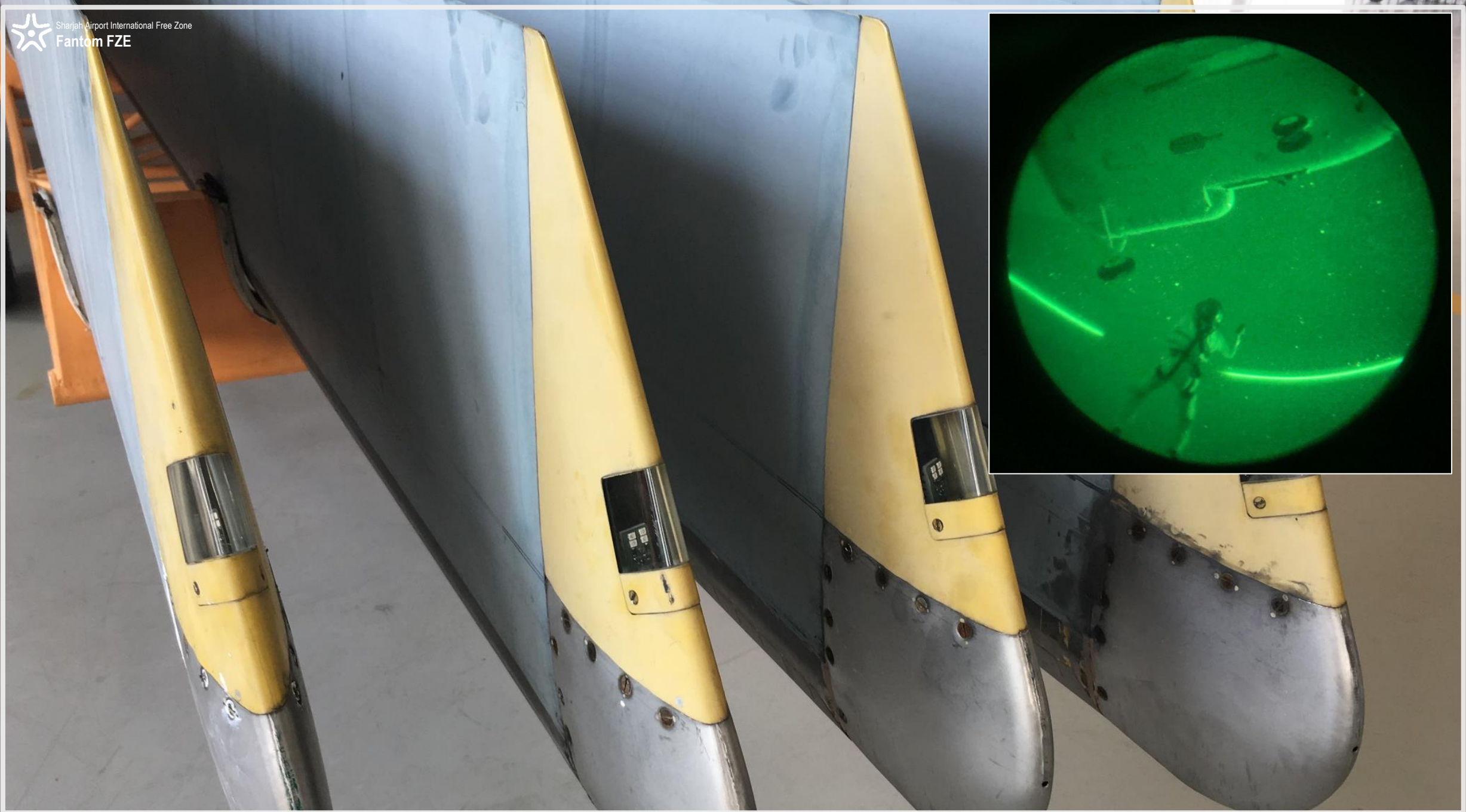


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SYSTEM OF GREEN ILLUMINATION OF INSTRUMENTS AND PANELS

The system of green illumination consists of special light panels (type III, IV, VI according to MIL-DTL-7788G), miniature LED lamps and dimmers.

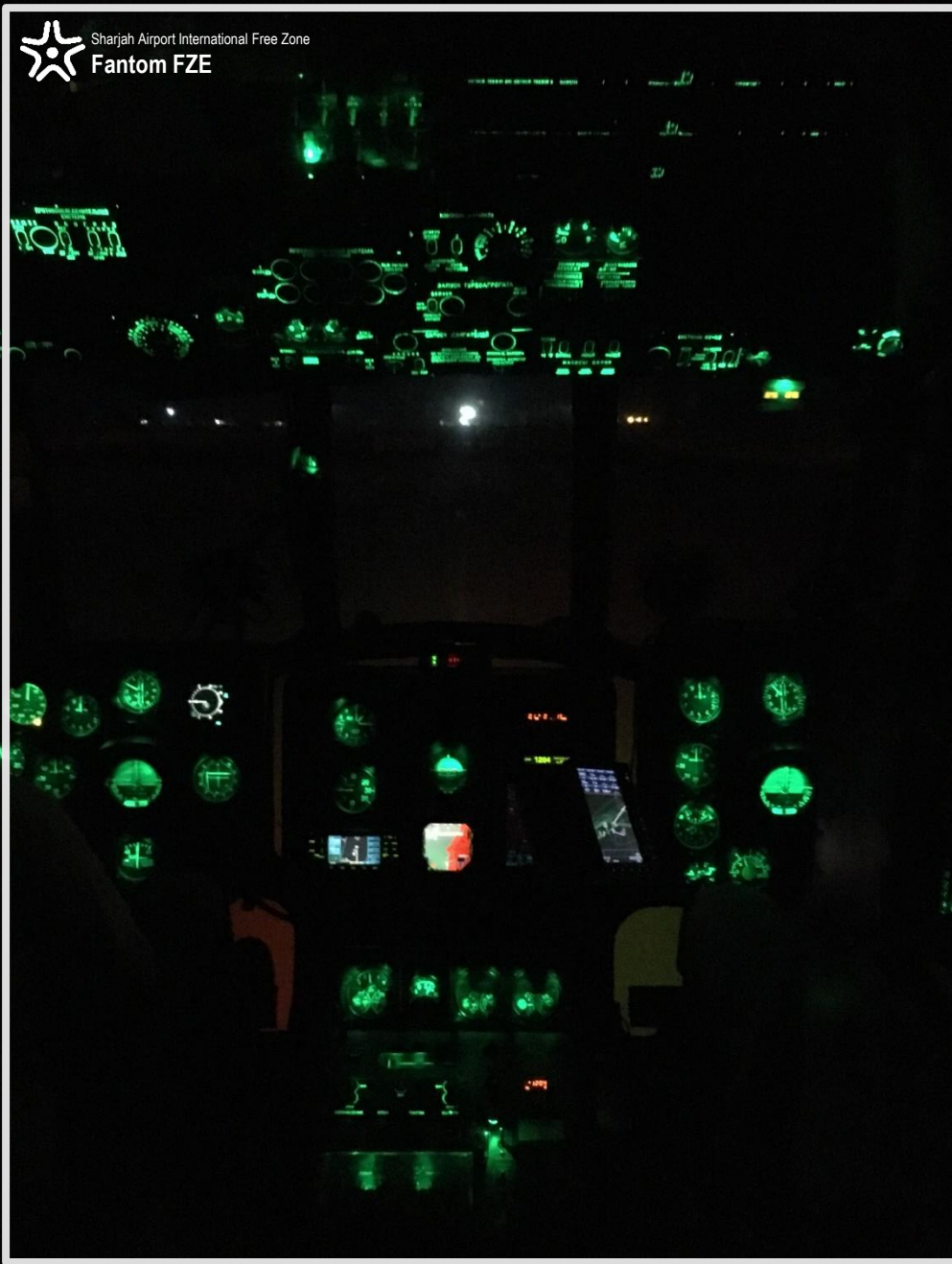
The electronic dimmers of the green illumination of the instrument equipment, as well as the control unit for the external illumination, are made in a shielded aluminum case and have built-in EMI-filters for input and output terminals.

- Electronic dimmers, with the logarithmic characteristic of the brightness adjustment, make it possible to achieve very smooth control of light, especially in the position of low brightness.
- Moisture protected construction, short-circuit protection, compact size.
- A wide range of operating temperatures - from -55C to +80C.





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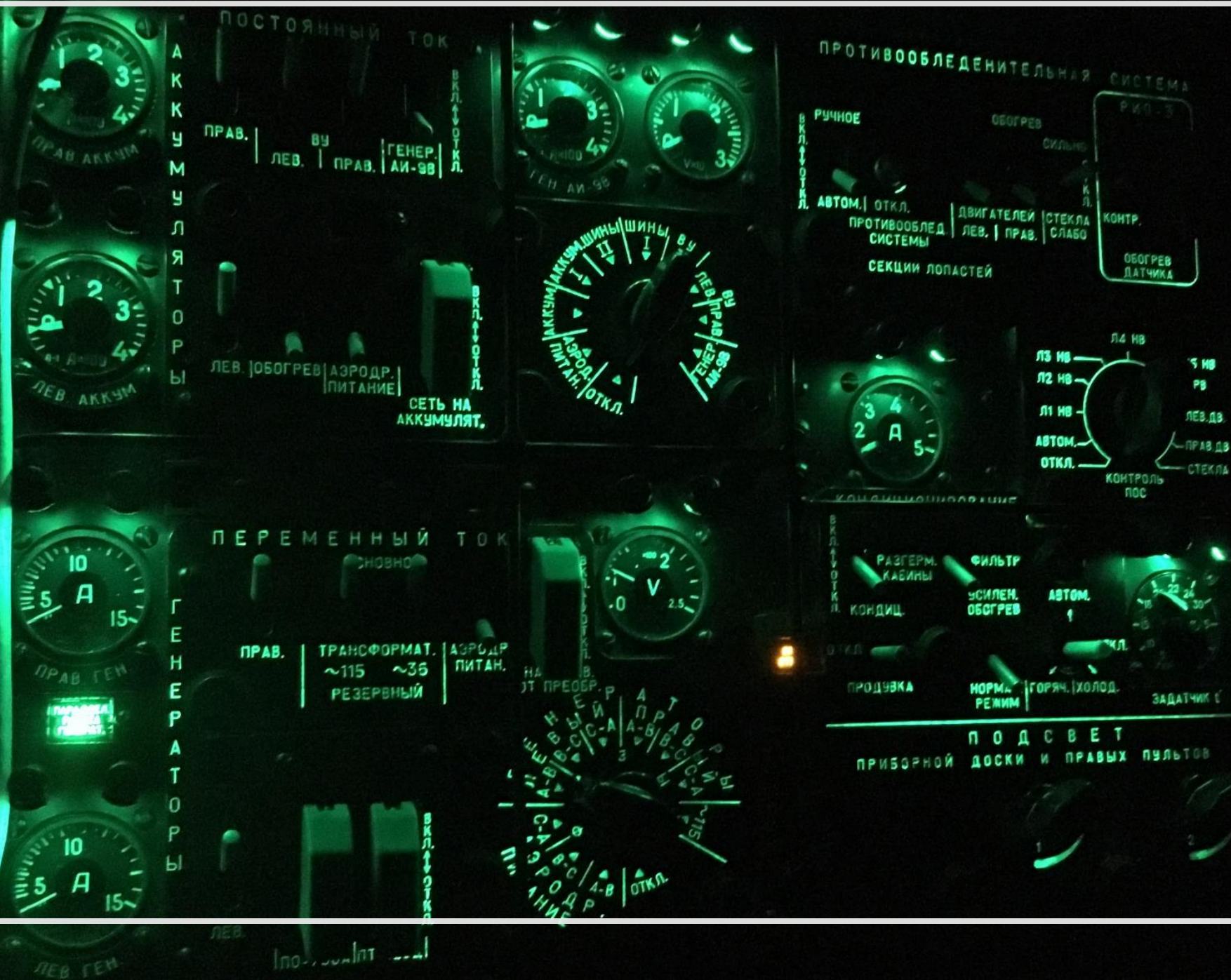




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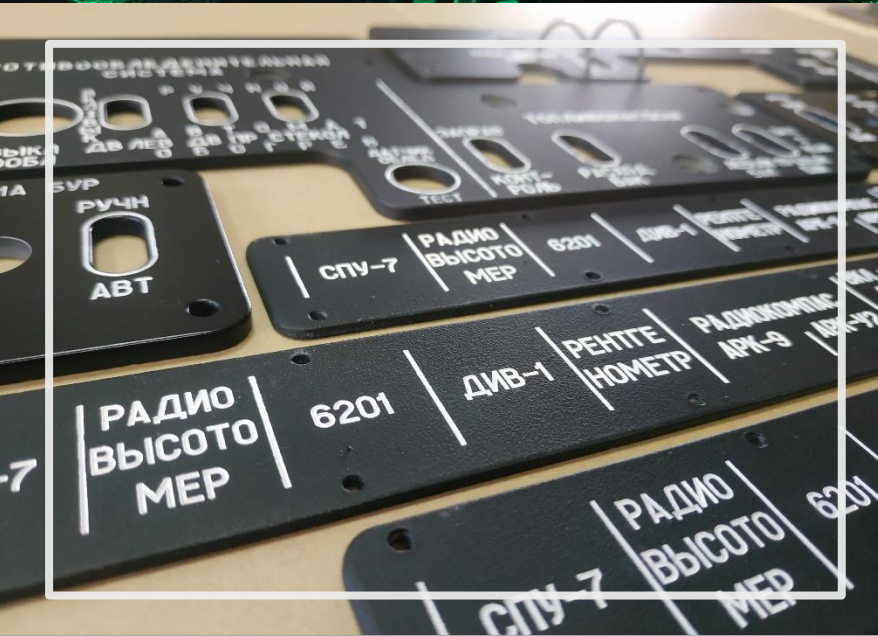
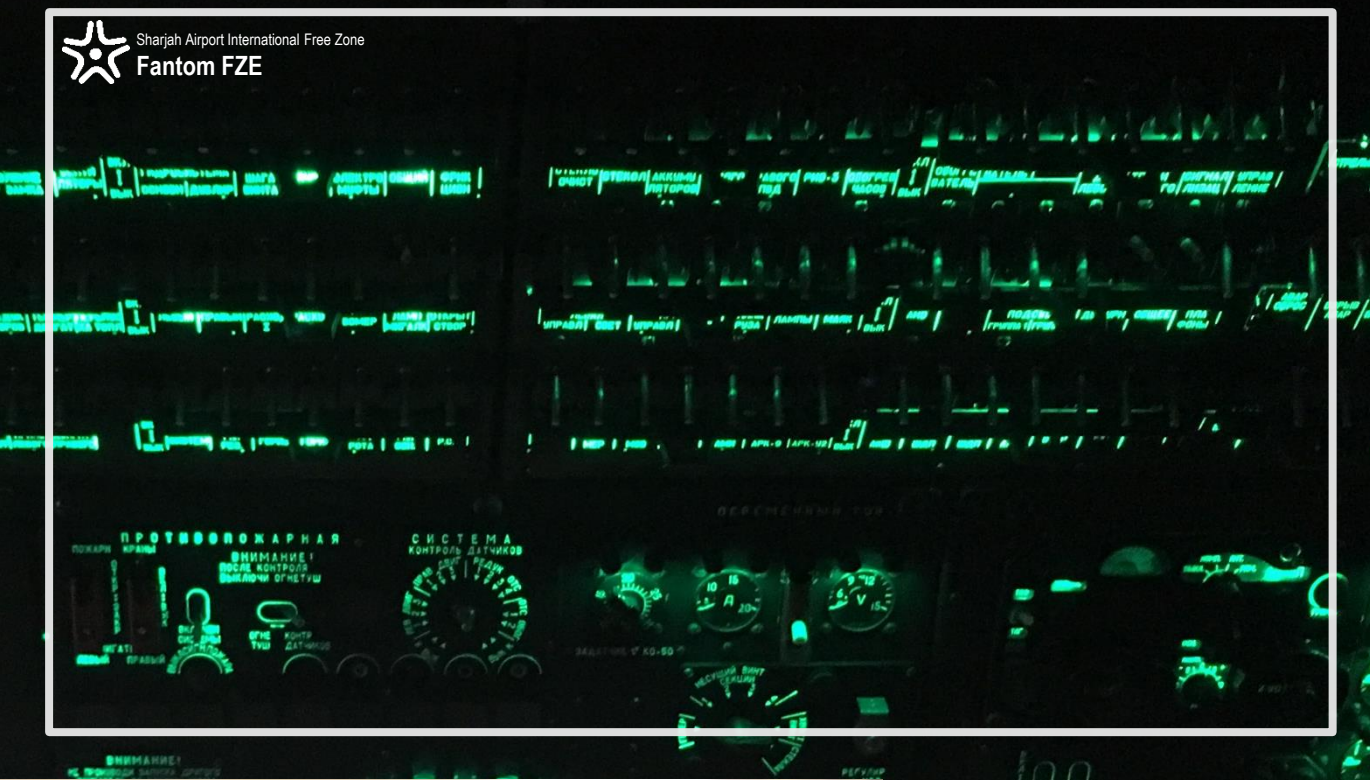
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LIGHT PANELS

Developed taking into account the location of toggle switches, buttons on each helicopter individually.

Manufactured from certified plastics, painting and varnish materials, resistant to abrasion, cracks and chips.

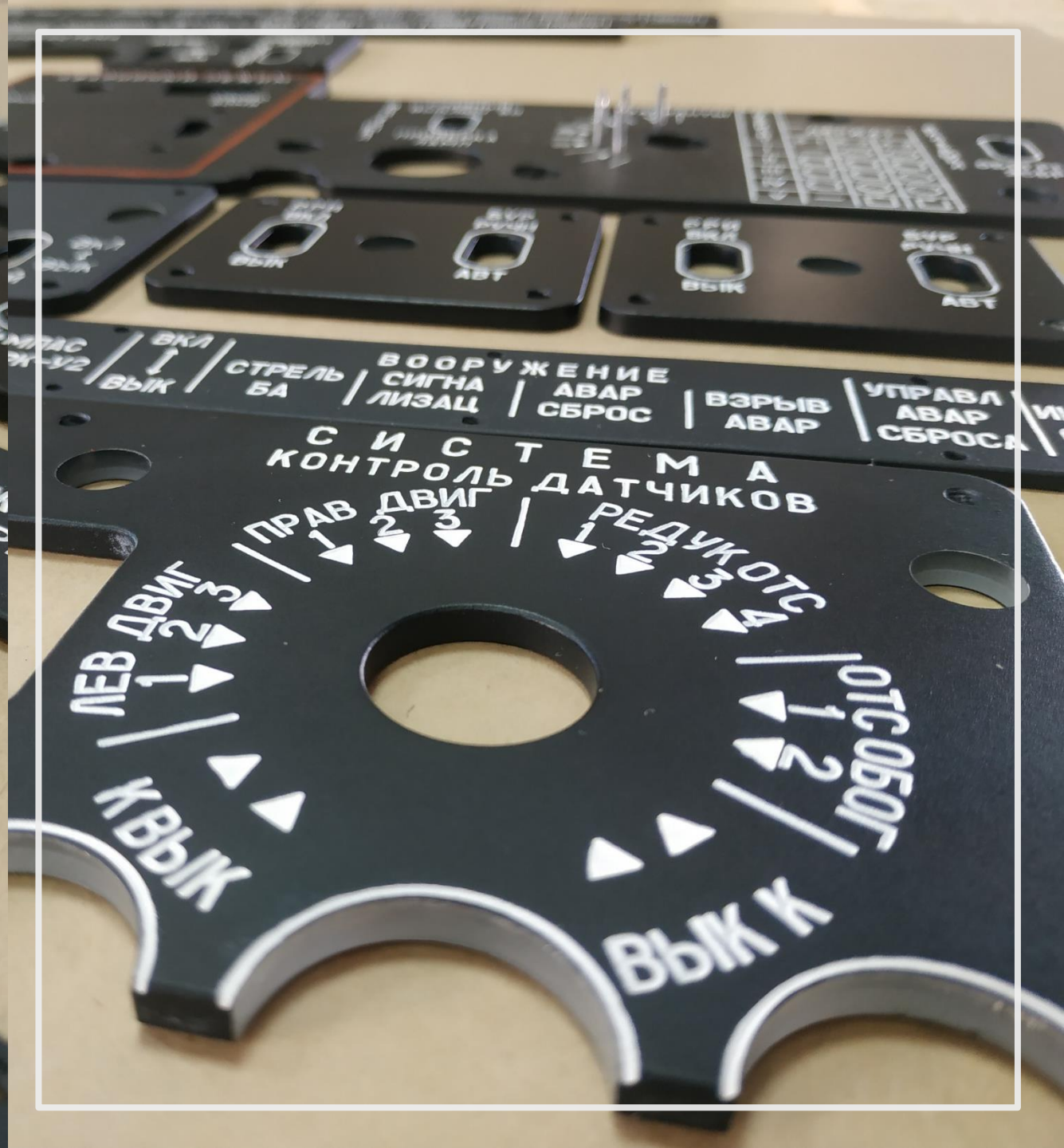
The design of the light panel with the use of a special light-conductive material and built-in optical components ensures uniform illumination of the entire panel and a comfortable reading of information.

ADAPTATION OF THE GENERAL LIGHTING OF THE PILOTS COCKPIT, CARGO AND RADIO COMPARTMENTS

- Replacement of standard lamps in dome lights with white, green and blue LED lamps, compatible with the NVG.
- Replacement of standard lamps in portable lights with white and green LED lamps, compatible with the NVG.



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ЗАПУСК		УПРАВЛ	ВЭМ-72	УКАЗАТ ПОВОРОТ	ВКЛ ↑ ↓ ВЫКЛ	АВТОПИЛОТ		ГИДРОСИСТ		РАДИО			
ТУРБОАГРЕГАТ	ДВИГАТЕЛИ	ОБОРОТЫ				ОСНОВН	ФРИКЦ	ЭЛЕКТРО	ОСНОВН	ДУБЛИР	СПУ	ВЫСОТО	КОМАНД
ЗАПУСК	ЗАЖИГАН	ЗАПУСК	ЗАЖИГАН										

ТОПЛИВНАЯ СИСТЕМА						КТ-76	СПУУ-52	ВКЛ ↑ ↓ ВЫКЛ	ПРОТИВОПОЖАРНАЯ СИСТЕМА		РАДИО		
КРАН	ПЕРЕКРЫВ	КРАНЫ	ТОПЛИ	НАСОСЫ	ТОПЛИВН				БАКОВ	СИГНА	1 ОЧЕРЕДЬ	2 ОЧЕРЕДЬ	КОМПАС
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ФАРЫ		НАРУЖ ОСВЕЩ	ПРОВЕРК ЛАМП МИГАЛКА	УПРАВЛЕНИЕ		ВКЛ ↑ ↓ ВЫКЛ	ПРОТИВООБЛЕДЕНИТ СИСТЕМА		СТЕКЛООЧИСТ		РАКЕТЫ СИРЕНА	КО-50
ЛЕВАЯ	ПРАВЯ			ОТКР ЗАМКА	УПРАВ		ПЗУ ДВИГАТ	ЛЕВЫЙ	ПРАВЫЙ			
УПРАВЛ	СВЕТ			ОСНОВН	ДУБЛИР		ЛЕНИЕ	ЛЕВОГО	ПРАВОВО	СО-121	СТЕКЛ	

SET OF LIGHTING EQUIPMENT ADAPTED FOR THE USE OF NVG CONSIST OF:

Dual-mode (visible/infrared) external lighting:

1. Left and right search/landing lights
2. Taxi light
3. Navigation lights
4. Anti-collision light
5. Blade tip lights
6. External lights control unit with harness
7. Search and taxi lights control unit with harness

Cockpit NVIS-compatible equipment:

1. Miniature LED lamps and fixtures
2. Illuminated LED panels (with backlit)
3. LED brightness dimmers
4. NVIS filters for additional avionics equipment

General NVIS-compatible LED lamps:

1. Dome lights in the cockpit (white/green)
2. Dome lights in cargo, radio and tail compartment (white/blue)
3. Utility lights (white)

NVIS-compatible advisory, caution and warning annunciators:

1. Miniature LED lamps
2. Optical filters and legends
3. LED brightness dimmers

Spare parts:

1. External and internal lighting equipment

SET of NVGs and aviation helmets for one flight crew

DELIVERY SET INCLUDES:

Miniature lamps

Branded LEDs with special NVIS filters that reduce the excess infrared radiation from LEDs to the levels required by MIL-STD-3009 specification.

Materials and electronic components can operate continuously in wide temperature range from -55°C to +85°C.



Lamp fixtures

New improved lamp caps are used to illuminate instruments and indicators on dashboards and panels accurately. The caps are specifically designed to work with miniature LED lamps. The caps provide uniform illumination of instrument scales, while protecting the area around the instruments from parasitic illumination, which allows minimizing glare and reflections of lamps in the cockpit windows. Lamp holders for illuminated panels are equipped with silicone seals, resistant to extreme environmental factors.



Illuminated panels (with backlit)

Chromaticity and radiance of internally illuminated panels are compliant with MIL-STD-3009 requirements and provide uniform and clear illumination of circuit breakers labels.



LED brightness dimmers

Digital brightness regulators (with pulse-width modulation) are used, which provide precise and smooth adjustment at all brightness levels (1024 gradations).



NVIS filters for additional avionics equipment

Special optical filters with a wear-resistant coating are used for displays and gas-discharge indicators. The filters block a range of near-infrared spectrum that affects the NVG, while the screen remains sunlight-readable. As a result, improves perception of information from the screens during the NVG operation.



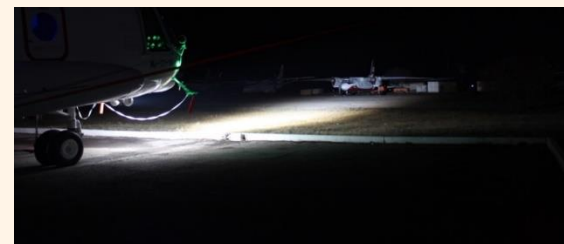
Dual mode search-landing and taxi lights

The lamps have an active cooling system with a large thermal inertia. In case of overheating of the LEDs, the built-in control system automatically smoothly reduces the brightness of the lamp, thereby eliminating the possibility of failure or degradation of the LEDs.

High-efficiency LEDs deliver $>250,000\text{cd}$ of white light and $>70\text{W/sr}$ of infrared (IR) light (at $+35^{\circ}\text{C}$ ambient temperature).

The luminous flux ensures the visibility of the ground surface from an altitude of up to 200m.

The optics of the lamp forms a focused beam of light with a narrow viewing angle, and completely cuts off the side illumination, which can reflect from the fuselage and interfere with the crew's NVG.



External lighting

Distinguishing features:

- Confirm to requirements of CS-29 and MIL-STD-3009;
- Lightweight and durable;
- Anti-vandal design (hard anodized duralumin cases, polycarbonate covers);
- Reliable electronic components;
- Specialized sealing materials.



Advisory, caution and warning annunciators

Miniature lamps, operating with special optical filters, which enhance contrast and clarity of labels.

Modified annunciators are compliant with MIL-STD-3009 and CS-29 requirements - do not affect the NVG in the night as well as provide excellent readability under direct sunlight.



Cockpit painting

For the best performance of NVG, operating in upgraded cockpit all panels and visible surfaces are painted in black matt paint for absorbing any possible reflections.



Set of NVGs and Helmets





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