

исследуемого ЛИЗ к категории «предметов, используемых в качестве оружия».

Следует подчеркнуть, что Госдума уже с 2011 года пытается противостоять на правовом поле лазерному хулиганству, приносящему вред транспорту, за счет введения дополнительной жесткой статьи в УК. В ноябре того года был принят в первом чтении законопроект, предлагающий уголовную ответственность за «действия, совершенные из хулиганских побуждений, угрожающие безопасности эксплуатации транспортных средств».

Депутаты Госдумы, являющиеся авторами этого законопроекта, позиционировали новую статью 213.1 как направленную в первую очередь против «лазерных хулиганов», однако упоминания лазера как орудия совершения преступления в тексте нет, что ставит под сомнение саму цель изначально. Что касается различных вариантов «нелазерных» хулиганских действий, угрожающих безопасности ТС (например, обстрел их из различных видов оружия, забрасывание камнями или другими предметами), то надо забывать, что в УК и КоАП давно существуют статьи, предусматривающие наказания за подобные деяния.

ЗАКЛЮЧЕНИЕ

1. Следует существенно увеличить размер штрафных санкций за правонарушение, предусмотренное статьей 6.3 КоАП, разъяснив в СМИ, что применение на улице или в общественных местах мощных «лазерных указок» является нарушением законодательства в сфере обеспечения санитарно-эпидемиологиче-

ского благополучия населения, влекущим за собой значительный штраф и изъятие орудия правонарушения.

2. Требуется неуклонно напоминать потенциальным нарушителям, что применение мощных «лазерных указок» в направлении воздушных судов в настоящее время является административным правонарушением, предусмотренным статьей 11.4 КоАП и влекущим за собой наказание в виде штрафа от трех до пяти тысяч рублей.

3. Особо стоит подчеркивать, что уже сегодня в отдельных случаях лазерное хулиганство может повлечь за собой уголовную ответственность в виде лишения свободы на срок до пяти лет.

ЛИТЕРАТУРА

1. Рахманов Б. Н., Кибовский В. Т. Противодействие нарастанию лазерной угрозы безопасности жизнедеятельности методами лазерной дозиметрии на открытых пространствах // Безопасность жизнедеятельности. 2013. — № 8. — С. 41–47.
2. ГОСТ 12.1.040–83. ССБТ. Лазерная безопасность. Общие положения.
3. ГОСТ Р 50723–94. Лазерная безопасность. Общие требования безопасности при разработке и эксплуатации лазерных изделий.
4. ГОСТ Р 12.1.031–2010. ССБТ. Лазеры. Методы дозиметрического контроля лазерного излучения.
5. СН № 5804–91. Санитарные нормы и правила устройства и эксплуатации лазеров.
6. Рахманов Б. Н., Кибовский В. Т. Оценка степени опасности и степени ослепляющего действия излучения лазерных изделий, работающих на открытых пространствах в видимой и ближней ИК области спектра // Приложение к журналу «Безопасность жизнедеятельности», 2014 г. — 57 с. (В печати).
7. IEC 60825–1:2007. Safety of laser products — Part 1: Equipment classification and requirements.
8. Рахманов Б. Н., Кибовский В. Т. Нормативное и правовое регулирование безопасного применения лазерной техники // Безопасность в техносфере. — 2013. — № 3. — С. 60–69. ●

ON THE LEGAL RESPONSIBILITY FOR LASER ENDANGERING

Rahmanov, Boris N. — D. Sc. (Tech.), professor of Moscow State University of Railway Engineering (MIIT), Moscow, Russia.

Kibovsky, Vladimir T. — expert at the Center for conformity assessment and quality validation of equipment, products and technologies (certification body ANO «AtomTehnoTest»), Moscow, Russia.

ABSTRACT

Hooliganism with the use of lasers against vehicles naturally causes legal implications in different countries.

Laser irradiation of the driver of the vehicle, particularly the pilot of an aircraft, leading to temporary blindness, and even to a loss of visual function can have very serious consequences, fraught with the death of all the road or flight passengers.

The authors analyze the legal framework of liability and

penalties for laser hooliganism; offer their mathematical apparatus to the methodology of risk assessment of laser radiation referring to transport operations.

ENGLISH SUMMARY

Background. Hooliganism with use of laser radiation against vehicles has long become an object for a legal, organizational and technical resistance in different countries. In 2011, numerous cases of laser threats towards transport and



primarily airborne aircrafts become widespread in Russia. Domestic media published articles on situations where the laser light was directed towards the aircraft (pic. 1). The terms «laser hooliganism» and «laser terrorism», introduced by journalists, were used widely.

Methods. The authors use media and legal content analysis to assess the range of threats and genesis of emerged laser vandalism against transport vehicles. They also use data on features of lasers of different types in order to underline the dangers of the open access to some of them.

Results. In the first part of the article the authors focus on laser attacks on transport. Their emergence can be explained by the following reasons.

Russian consumers are offered, in online stores, under branding of «Laser Pointer», safe at first sight, powerful laser designators with attractive colored beams of light (pic. 2). Those laser designators by hazard of output laser radiation do not go to any comparison with low-powered (less than 1 mW) «red» Chinese-made laser pointers (wavelength $\lambda = 650$ nm), appeared on the domestic market in the 1990s.

During the period from January to September 2012 according to Rosaviation (Federal aviation agency) 63 attempts of radiation impact on civil aircraft were recorded, at the same time for the same period of the following year there were 127 such attempts. The authors know fifteen incidents that occurred prior to August 2013, and certainly, they do not constitute the whole picture.

The authors give two examples. On the 13th of August 2013 was recorded the fact of the laser beam direction («Green color») towards the aircraft which was flying from Frankfurt to Moscow and landing at the airport «Sheremetyevo». During the irradiation attempt plane was near the village of Krasnaya Gorka. Map distance from Krasnaya Gorka to the boundary of the airport is about 5 km.

On the 28th of August 2013 near the town of Klimovsk was fixed an attempt of laser beam irradiation of an aircraft Krasnodar-Moscow, landing at the airport «Vnukovo». Map distance from Klimovsk to the boundary of an airport is about 30 km.

At present, danger to vehicles constitute such laser devices as target designators for hunting and combat weapons, laser models of firearms, laser theodolites and levels, laser rangefinders-tape measures and other gadgets with laser semiconductor diodes.

Furthermore, lighting effects involving laser light are increasingly used in the entertainment industry. During theatrical and entertainment events in the open air and massive shows, high power laser beams are constantly sent into the sky, that certainly poses a significant threat to air transport, especially when such activities are unauthorized and become part of corporate entertainment.

In recent years, there have also been cases of «laser hooliganism» directed against land vehicles, resulting in hazardous impact on eyes of automobile drivers and train drivers.

Any laser device is a high-risk product, primarily related to the ability of laser radiation, generated in the spectral range from 380 to 1400 nm, to cause irreparable damage to the human visual apparatus.

Radiation with wavelengths of 380–1400 nm (visible and near infrared region of the spectrum) passes through the ocular media and are absorbed by the retina unlike radiation with $\lambda < 380$ nm (UV) and $\lambda > 1400$ nm (average and far-infrared radiation). There is a widespread misconception that laser radiation, which

is invisible for eyes and generated in the near-infrared region of the spectrum (spectral interval $750 < \lambda \leq 1400$ nm), is safe for the eyes.

Laser devices, functioning in this spectrum interval, are designed for measuring distance to or remoteness of an object. But their use for civil purposes may be dangerous to the human eye (e. g., the car driver) at small distances of irradiation. Appropriate federal agencies, which should monitor compliance with rules for laser safety, do not pay adequate attention to this fact.

Laser radiation is focused on the retina in the form of a spot with extremely small diameter (10–40 microns), in which a high density of (energy) radiation power is created, which can lead to retina damage. Even a very low-powered laser beam, which is generated in the spectral range 380–1400 nm, is able to damage the retina at low irradiation distance. Radiation with a wavelength $\lambda < 380$ nm or $\lambda > 1,400$ nm reaches the retina and cannot damage it.

Laser radiation, generated in these regions of the spectrum, can damage the outer layers of the eye. Laser radiation generated in middle or far infrared regions of the spectrum can be considered as relatively harmless for humans as compared to visible laser radiation of the same power.

Unfortunately, recently developed modern distance laser meters with radiation wavelength of 1540 nm is not yet widely available. They are termed «eye safety» («eye-safe»). The use of such distance laser meters and laser velocimeters to address various information-measuring tasks in open spaces would help to ensure the laser safety of vehicles in the near infrared region of the spectrum, up to a radical exclusion of laser threats. There is a need for the administrative and criminal law reaction to the laser threats towards personal and public safety, which, of course, must be based on new conditions of normative legal acts in the field of laser safety.

In the second part of the article authors focus on normative regulation of laser safety. In Russia the issues of laser safety are covered in certain normative acts ([2], [3], [4], [5])

According to these acts, laser safety is a set of technical, sanitary and organizational measures to ensure the safe and harmless working conditions of personnel using laser devices.

Maximum permissible levels of laser radiation at a single exposure are levels of radiation, with which impact there is a little likelihood of reversible abnormalities in the body of a working man.

Traditional regulatory framework for laser safety [2–5], created mainly in the 1980s–1990s, is designed primarily to provide laser safety of specialists using laser technology in the confined spaces of production facilities, research laboratories and medical offices.

The authors have developed a methodology for assessing the degree of laser radiation danger and the degree of laser radiation dazzle for laser products, functioning in open spaces in the visible and near infrared region. Work [6], which proposed a mathematical formula to calculate distances from laser devices to the borders of the laser- hazardous areas $Z_{\text{ноз}}(m)$ and distance from laser devices to the border areas of laser dazzle $Z_{\text{зоч}}(m)$ is in the process of publishing.

As for regulation of laser safety in foreign countries, there are certain examples. In the USA there is Z 136.6 «American National Standard for Safe Use of Lasers Outdoors», which deals, among others, with the provision of flights safety in case of possible irradiation of aircraft with visible laser radiation and regulates safe

flights zones of the aircrafts. Nowadays, equivalent European or international standards do not exist.

In 1999, the International Civil Aviation Organization (ICAO) has formed a study group to assess the risk from the laser. The result of this work was the «Manual on Laser Emitters in the aspect of safety».

It should be noted that foreign regulations are based on laser safety standards, governed by international standard IEC 60825-1:2007 «Safety of laser products – Part 1: Equipment classification and requirements» [7]. According to the data provided in the works [1, 6, 8] there are more rigid standards of laser safety in Russia, in comparison to Europe and the USA.

The authors calculated the spatial parameters of aircrafts irradiation basing on the information of a number of incidents, which was published in recent years, and came to the conclusion that in most reported cases the real threat to the flight did not arise even by criterion of pilot's blinding. This means that the common speculative assessment of the laser hooliganism threat, which is not based on the maximum permissible levels, is somewhat overstated.

But the authors emphasize that laser hooliganism should be prevented, primarily by limiting the free sales of laser designators of high and middle power.

In the third part of the article the authors focus on administrative and criminal law regulation in Russia, which can be applied to «laser hooliganism».

It is prohibited to use laser devices, designed for functioning in open space, which have in laser radiation power more than 80 MW in spectrum interval $380 < \lambda \leq 600$ nm, and in spectrum interval $600 < \lambda \leq 750$ nm – power of more than 160 MW.

To ensure this prohibition, certain articles of Code on Administrative Offences (articles 6.3. and 11.4.) are applied. Moreover, Government Resolution of 19th of July 2012 № 735 introduced paragraph 56.1 in the Federal Rules of use of airspace as follows: «The use of lasers and laser-based products in the direction of taxiing, taking off, landing and flying aircrafts is prohibited».

Keywords: vehicle, aircraft, laser radiation, laser safety, «laser hooliganism» administrative offense, criminal offense.

REFERENCES

1. Rahmanov B. N., Kibovskiy V. T. Countering the rise of laser threat towards life safety by laser dosimetry methods in open spaces [*Protivodeystvie narastaniyu lazernoy ugrozy bezopasnosti zhiznedeystel'nosti metodami lazernoy dozimetrii na otkrytykh prostranstvakh*]. *Bezopasnost' zhiznedeystel'nosti* [Life safety], 2013, № 8, pp.41–47.
2. Russian national standard [GOST] 12.1.040–83. SSBT. Laser safety. General provisions. [*Lazernaya bezopasnost'. Obschie polozeniya*].
3. National standard [GOST] R 50723–94. Laser safety. General safety requirements for development and use of laser products [*Lazernaya bezopasnost'. Obschie trebovaniya bezopasnosti pri razrabotke i ekspluatatsii lazernykh izdeliy*].
4. National standard [GOST] R 12.1.031–2010. SSBT. Lasers. Methods of dosimeter control of laser radiation. [*Lazery. Metody dozimetricheskogo kontrolya lazernogo izlucheniya*].

The authors are critical of this wording of the offense provided for in paragraph 56.1 of Federal Regulations, since it does not contain any characterizing features of an offence instrument (laser), and essentially prohibits the use against aircraft of quite eye-safe («laser safety») types of laser rangefinders, having an radiation wavelength $\lambda = 1540$ nm. For more details see [8].

As for criminal law, intentional irradiation of a man with laser beam is a variety of so-called «armed hooliganism» (paragraph «a», Part 1 of Art. 213 of the Criminal Code), which carries a maximum penalty of imprisonment for up to 5 years. Moreover, the application of this article of the Criminal Code requires serious evidence of vehicle irradiation (plane, train, car, etc.) and real threats to the health of the driver (pilot, driver, and chauffeur).

It was mentioned by the authors that high-powered laser pointers according to their technical parameters, characterizing hazardous impact on the eyes, can be compared with illegal dazzling laser weapons, prohibited by the Vienna protocol 13.10.1995. [1].

Conclusions. The authors make the following proposals.

1. The size of penalties for the offense provided for in Article 6.3 of the Code of Administrative Offenses should be significantly increased, and it should be explained to the media that the use of powerful «laser pointer» in public places is a violation of legislation in the field of sanitary and epidemiological welfare of the population, entailing a substantial fine and seizure of offense instrument.
2. It should be consistently explained to potential violators that the use of powerful «laser pointers» in the direction of aircraft currently is an administrative offense provided for in Article 11.4 of the Code of Administrative Offenses and results in a fine of three to five thousand rubles.
3. It should be specially noted that today in some cases laser hooliganism may entail criminal penalties of imprisonment for up to five years.

Координаты авторов (contact information): Кибовский В. Т. (Kibovsky V. T.) – derb.nab@mail.ru, Рахманов Б. Н. (Rahmanov B. N.) – rbn8@yandex.ru.

Статья поступила в редакцию / article received 31.10.2013
Принята к публикации / article accepted 18.12.2013

