TEKA. COMMISSION OF MOTORIZATION AND ENERGETICS IN AGRICULTURE – 2012, Vol. 12, No.4, 127-130

Dangerous radiation when using your computer

Valeriy Maletkin, Oleg Druz, Lydmila Maletkina

Volodymyr Dahl East Ukrainian National University, Lugansk, Ukraine

Summary. It is established that such monitors are the source of soft X-ray, ultra-violet, infra-red, electromagnetic radiation has been done in this article.
Key words: human vital activity, monitor, X-ray, ultra-violet, infra-red, electromagnetic radiation.

INTRODUCTION

Scientific and technological progress characteristic for modern century is impossible without the application of personal computers in all spheres of human vital activity: at private enterprises, organizations, industrial sites, in education, medicine and so on. Computer technologies play more and more decisive role both in professional and everyday person's activity even from the first years of his studies at school. Lately a constant and gradual diminishing the overall dimensions of a great variety of personal computers simultaneously with the growth of their productivity has been observed. Using personal computers and mobile devices of information representation – notebooks, Desktop replacements, Ultra – Mobile PCs, Subnotebooks, ultraptables, Handleheld PCs, desktop PCs) is one of the factors, having negative influence on a person's health. The application of personal computers is accompanied by PC user's creative thinking activity, visual analyser effort of a person, the considerable concentration of attention against a background of a nervous – emotional effort, and also the influence of PC radiation on the person's organism.

RESEARCH OBJECT

The analysis of the factors, influencing human vital activity.

RESULTS OF EXPERIMENTAL RESEARCH

The analysis of the latest publications, devoted to the influence of PCs on a person's health has revealed some essential factors. They are the following.

While working with the computers more than 6 hours a day and having industrial experience more than 2 years we can observe different changes in functioning such organs as a spleen, a pancreas, cerebrum vessels, reproductive disorders, the formation of tumors in a thyroid gland. The authors point out the association of these factors with the influence of electromagnetic radiation emitting from the monitors on the basis of cathode – ray tube [Piskunova L.E., Prilipko V.A., Zubok T.O., 2012., Grachyov N.N., 2005., Gordiyenko V.A., 2006., Avraamov U.S., 2002., Kechiyev L.N., 1997., Kasianov M.A., Gunchenko O.M., Medianic V.O. [and others]., 2008., Valeriy Maletkin, Lydmila Maletkina, Oleg Druz., 2010.].

It is established that such monitors are the source of soft X-ray, ultra-violet, infra-red, electromagnetic radiation (EMR) [Myhailyuk V.O., 2008.]. According to the information of the Russian Electromagnetic Safety Centre, the level of electromagnetic radiation (EMR) in the zone of PC operation exceeds a biologically dangerous level which must be decreased [Myhailyuk V.O., 2008., Druz O.N., Maletkin V.N., 2009].

In the period of Sun's activity and magnetic storms even during a weakly perturbed magnetosphere (with the index of geomagnetic activity Kp from 3 to 4) 80% of users observe the reduction of their working efficiency already in 50 – 60 minutes of a strenuous visual work, there appear a headache and tiredness [Shandala M.G.,

Zuyev V.G., Ushakov I.V., Popov V.I., 1998., Bannikov U.A., 1988.].

THE UNSOLVED PROBLEMS

When using your computer the levels of electromagnetic radiation (EMR) are regulated by the following normative documents [Kechiyev L.N., 1997., Shandala M.G., Zuyev V.G., Ushakov I.V., Popov V.I., 1998., Bannikov U.A., 1988., . Meltser A. V., Nikitina V.N., Naumova T.M. and others., 2001., . Afanasiev A.I., Dolotko V.I. and others., 1998., . DSanPiN 2.2.2/2.4.1240-03, Tarasova L.A., Muhina G.N., Lagutina G.N., Matyuhina V.V., 1995., Dubrov A. P., 1992., Pol Brouder., 1990., Kirikova O. V., 1992., Litvak I.I., 1999., Miagchenko O.P., 2010.]: GOST 12.1.006-84, GOST 12.3.002-75, GOST 12.2.003-74, GOST 12.1.045-84, MPR I, MPR II, TCO'92, TCO'95, TCO'99, TCO'O3, TCO'05, DSanPiN 3.3.2.007-98, DSanPiN 2.2.2.542-96. Certainly, the transition from electronic-radial monitors to liquid-crystal ones makes it possible for PC users to get rid of electrostatic fields and electromagnetic radiation, but the problem of electromagnetic radiation (EMR) has not been solved yet. In spite of the existence of the above mentioned normative documents which restrict the levels of electromagnetic radiation (EMR), they aren't able to take into account the whole variety of information display technologies, the peculiarities of their application, the rates of computer technologies development.

STATEMENT OF THE PROBLEM IN GENERAL

The main task of this article is the elucidation of dangerous factors when using mobile devices of information representation (notebooks, liquid – crystal monitors); the substantiation of the directions of EMR influence on the users of PCs with liquid – crystal monitors (LCM).

PRESENTATION OF THE BASIC RESEARCH MATTER

While using portable PCs they are mostly accommodated as nearer to the user as possible, in most cases – on his knees or on a palm (laptop), therefore, the sources of radiation with greater intensity have an influence on the area of person's vitally important organs. Furthermore, modern portable PCs have wireless modules which are also the sources of emanation. For example, the level of electromagnetic radiation (EMR) from Wi-Fi is equal to 50 mWt, and from Bluetooth – 1 mWt, hereto the time of action of these sources may be equal to 6 hours a day that causes harm for a person's health.

Two modes of power supply (from a built – in accumulator or from a network) are peculiar to PCs with liquid – crystal monitors (LCM). In the case with an accumulator, as the measurements showed [Piskunova L.E., Prilipko V.A., Zubok T.O., 2012.], the levels of electromagnetic radiation are lower. In the mode of power supply from a network, a portable PC emits an electric constituent of an alternating electromagnetic field which, in its intensity, is slightly different from PCs with electronic – radial monitors. Fig.1 shows the electric field tensity of the Notebook Epson at two distances of 30 cm (a real distance when using a liquid – crystal monitor) and 50 cm (according to MPR II methods) from the centre of a keyboard. As fig.1 shows, the emissions considerably exceed the standards both in the first and in the second diapasons.

In the mode of power supply from an accumulator in the majority of portable PCs the electric field tensity in the first diapason appreciably exceeds the standards and in the second diapason the exceeding is observed only on the right and behind the screen. The pictures of the notebook Samsung field in two modes of power supply are given as an example on fig. 2. The levels of electromagnetic radiation of portable PCs exceed the normative standards for the majority of PCs with electronic-radial monitors.

PROSPECTS OF FURTHER INVESTIGATIONS

The dangerous and harmful factors that occur when using modern means of information representation require further investigations, studies and working out additional normative documents with their regulation. A number of factors have not been explored up to now. They are:

- the influence of portable PCs on the person's organs of sight;
- the diseases of vertebral column and joints;
- the subjective and objective user's health;
- overheating internal tissues which have no heat receptors in a person's organism;
- mental and psycho-physiological processes;
- industrial productivity;
- a working posture.

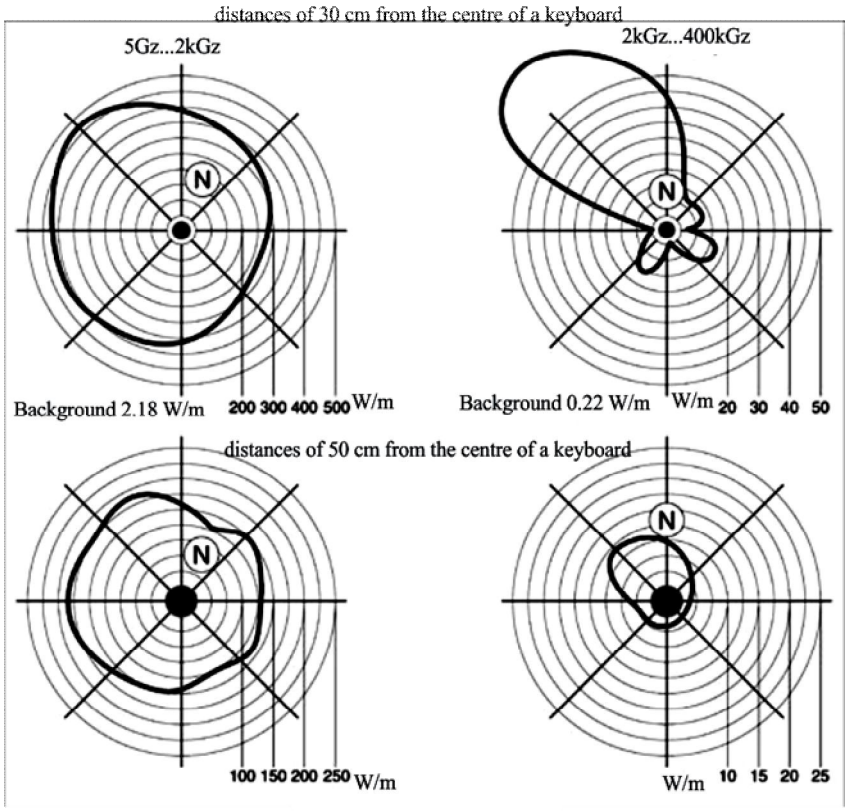

Fig. 1. The emissions considerably exceed the standards both in the first and in the second diapasons [Piskunova L.E., Prilipko V.A., Zubok T.O., 2012.]

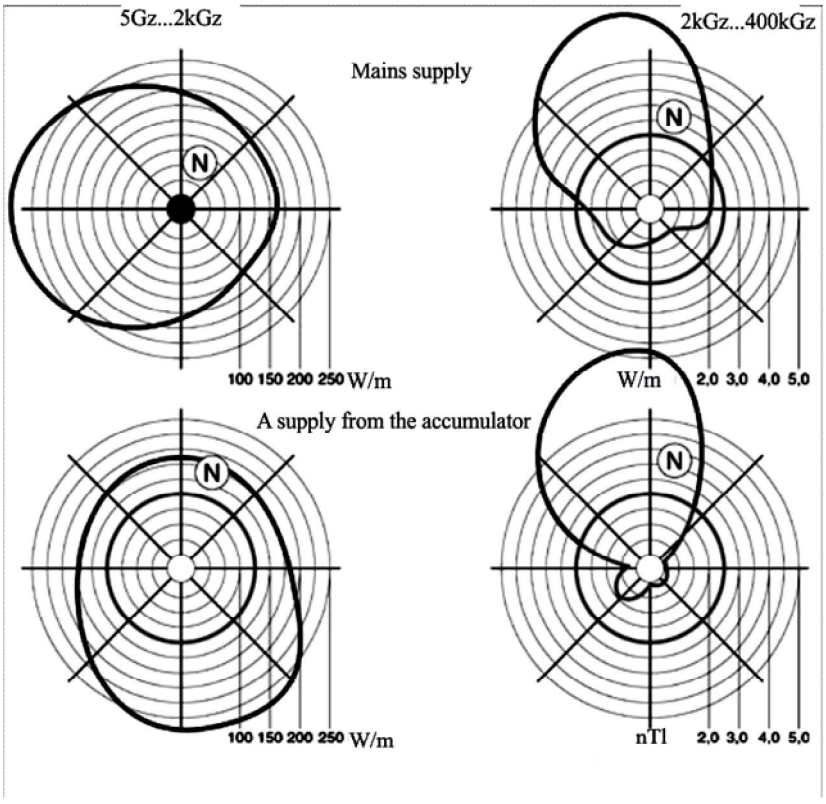

Fig. 2. The levels of electromagnetic radiation of portable PCs exceed the normative standards for the majority of PCs with electronic-radial monitors [Piskunova L.E., Prilipko V.A., Zubok T.O., 2012.]

CONCLUSIONS

1. The investigations of many scientists are indicative of the danger of non – regulatory application of portable PCs (notebooks) and liquid – crystal monitors.

2. The rates of computer technologies development leave behind working out normative documents that regulate dangerous and harmful factors when using PCs.

3. It is necessary to work out a normative basis being able to make producers of PCs take into consideration all possible dangerous factors as early as on the stage of designing and development. It goes without saying that it should be done on the international level.

4. The investigations of dangerous factors when using the latest computer technologies should be necessarily continued.

REFERENCES

1. **Piskunova L.E., Prilipko V.A., Zubok T.O., 2012.:** Safety of human vital activity. Textbook – K., Academy, – 221 pp.
2. **Grachyov N.N., 2005.:** The protection of a person from dangerous emanations [text]: Textbook for higher and secondary educational establishments. / Grachyov N.N., Myrova L.O. – M.: Binom. Laboratory of knowledge, – 317 pp.
3. **Gordiyenko V.A., 2006.:** Physical fields. Problems of ecology, health and life on the Earth [text] – V.A. Gordiyenko. – M.: Astrel. AST. Prof.publish.house, – 316 pp.
4. **Avraamov U.S., 2002.:** The protection of a person from electromagnetic influence [text]: Textbook / Avraamov U.S., Grachyov N.N., Shlyapin A.D. – M.: MGIU, – 432 pp.
5. **Kechiyev L.N., 1997.:** Elements of ergonomic safety work with computers [text]: / Kechiyev L.N., Litvak I.I. – M.: MGIEM, – 176 pp.
6. **Kasianov M.A., Gunchenko O.M., Medianic V.O. [and others]., 2008.:** The protection of PC users' job [text]: Textbook for higher students. – Luhansk.: East Ukrainian V. Dahl National University, – 124pp. – ISBN 978-966-590-683-4.
7. **Myhailyuk V.O., 2008.:** Safety of human vital activity – education, science, practice: scientific works of the conference, 20-21, March, 2008, Mykolaiv. / Editor-in-chief V.O. Myhailyuk. – Mykolaiv: NUK, 2008. – 292pp. – ISBN 978-966-321-092-6.
8. **Druz O.N., Maletkin V.N., 2009.:** The influence of electromagnetic radiation when using your notebook. Materials of the international scientific and practical conference. 17.12. 2009. The problems of labour and social technologies in the industrial region. Theory and practice. Lugansk – 334 pp.
9. **Shandala M.G., Zuyev V.G., Ushakov I.V., Popov V.I., 1998.:** Reference book on electromagnetic safety of working people and population. – Voronezh: Istoki – 244 pp.
10. **Bannikov U.A., 1988.:** Radiation. Doses, effects, risk: Translation from English. U.A. Bannikov – M.: Mir, – 112 pp.
11. **Meltser A. V., Nikitina V.N., Naumova T.M. and others., 2001.:** A safe computer in office and at home. — SPb: Prof. publish. house by Sizov M.P., – 82 pp.
12. **Afanasiev A.I., Dolotko V.I. and others., 1998.:** Methods of measurements and evaluations of ergonomic and safety parameters. – M.:GNPP «Cyclone-Test», – 28 pp.
13. DSanPiN 2.2.2/2.4.1240-03 «Hygienic requirements to videodisplay terminals, personal computer and job organization». Ministry of Health, Russia, 2003.
14. **Tarasova L.A., Muhina G.N., Lagutina G.N., Matyuhina V.V., 1995.:** The influence of nervous-strenuous work on the development of mental disorders inherent to operators. // Labour medicine and industrial ecology. 1995, №1, pp.11-13.
15. The problems of safety of modern PCs monitors // PC Week. 2000. № 4 (226).
16. **Dubrov A. P., 1992.:** Earth radiation and person's health. // Arguments and facts. – M.
17. **Pol Brouder., 1990.:** Magnetic fields – a threat to a person's health. // World of PCs. 1990, №5.
18. **Kirikova O. V., 1992.:** Protection from electromagnetic radiation. – M.: Radio and communication, 1992. – 42 pp.
19. **Litvak I.I., 1999.:** Computers at school. 1999. №6,7.
20. **Miagchenko O.P., 2010.:** Safety of human and society vital activity. Textbook – K., Centre of educational literature, – 384 pp.
21. **Valeriy Maletkin, Lydmila Maletkina, Oleg Druz., 2010.:** Planetary safety of life activity as the way of spiritual integration of mankind // TEKA Com. Mot. Energ. Roln. – Lublin, 2010. – Vol. XB. – P. 23 – 27.
22. **Valeriy Maletkin, Lydmila Maletkina, Oleg Druz., 2010.:** Research of effect of physical fields on ability to live of a person. // TEKA Com. Mot. i Energ. Roln. – OL PAN, 2010. – Vol. XD. – P. 196 – 200.

ОПАСНЫЕ ИЗЛУЧЕНИЯ ПРИ ИСПОЛЬЗОВАНИИ КОМПЬЮТЕРА

Валерий Малеткин, Олег Друзь, Людмила Малеткина

Аннотация. В данной статье установлено, что электронно-лучевые мониторы являются источником мягкого рентгеновского излучения, ультрафиолетового, инфракрасного, радиочастотного и электромагнитного излучений.

Ключевые слова: безопасность жизнедеятельности, рентгеновское излучение, ультрафиолет, инфракрасное излучение, электромагнитное излучение.