

SAFETY RULES WHEN WORKING WITH AN OSCILLOSCOPE

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Abstract. The article is devoted to the issue of safety when working with oscilloscopes. It considers the main rules and recommendations aimed at preventing possible dangers and ensuring reliable protection of employees. Important aspects of physical and electrical safety when working with this type of equipment are also addressed.

The need to prevent various injuries and dangerous situations, the use of personal protection and general recommendations for safe work with oscilloscopes.

Keywords: oscilloscopes, safety, rules, risks, protection, electronics.

Анотація. Стаття присвячена питанню безпеки при роботі з осцилографами. В ній розглядаються основні правила та рекомендації, спрямовані на запобігання можливим небезпекам та забезпечення надійного захисту працівників. Також розглядаються важливі аспекти фізичної та електричної безпеки під час роботи з цим типом обладнання.

Необхідність запобігати різним травмуванням і небезпечним ситуаціям, використанню індивідуального захисту та загальних рекомендацій по безпечній роботі з осцилографами.

Ключові слова: осцилографи, безпека, правила, ризики, захист, електроніка.

Introduction. An oscilloscope is a device for measuring, observing and recording electrical signal parameters. Oscilloscopes are an integral part of the work of many electronics and engineers. However, non-observance of safety rules when using them can lead to serious dangers. In this article, we will look at the basic safety principles when working with oscilloscopes and give recommendations to ensure protection during their use.

Analysis of the state of the issue. Oscilloscopes are used to measure and analyse electrical signals in devices and electronic circuits. Despite their usefulness, working with them can be potentially dangerous. Insufficient knowledge of the technique and failure to follow safety rules can lead to injury and damage to the equipment. Digital oscilloscopes are also divided into memory, phosphor and stroboscopic [1]. Working with oscilloscopes requires compliance with certain basic safety principles.

The purpose of the work. The purpose of this paper is to provide clear and specific recommendations for safe operation of oscilloscopes. To achieve this goal, we will look at key aspects of security and will provide practical advice to avoid possible risks.

Methods, materials and research results. Beginner electronics sooner or later face the need to check complex schemes of generators, pulse devices, etc. At the same

time, it is important to clarify not only the level of current and voltage, but also general features of work, and in dynamics. And at this stage of becoming an electronics specialist, he simply needs a special oscilloscope device that allows measuring analog signals, digital pulses, etc.

Before using the device, you should carry out work on its grounding. For this, a special cable is used, which guarantees the correct operation of the device. Do not forget about the so-called feelers. They are also connected to special grounded phases. And in order to choose the «ground» correctly, you should study the oscilloscope ratings. According to the method of processing the input signal, oscilloscopes are divided into analog and digital. According to the number of beams, they are divided into single-beam, double-beam, etc. An N-beam oscilloscope has N signal inputs and can simultaneously display N graphs on the screen. When starting to operate the device, it is necessary to use only the power cable that is included in its kit.

Before using the control and measuring equipment under consideration, it is necessary to check the presence of this element [2]. In addition, it is important not to remove the power cable from its slot while the device is operating. Otherwise, there is a high probability of electric shock. It is forbidden to work with the device in the absence or opening of the cover that closes its internal mechanism. Compliance with this rule will avoid electric shock. You should also not touch circuit elements or open parts of the device that is in working (connected) condition.

To avoid any accidents, it is necessary to follow electrical safety standards and correctly connect the network to the oscilloscope. To ensure physical safety, avoid exposed components when handling the oscilloscope and use isolation devices when necessary. When working with an oscilloscope, it is important to ensure that the image is not reduced to one bright point. Otherwise, the electron beam will burn the phosphor of the screen. If necessary, you need to reduce the brightness to the minimum level. All maintenance and repair of the oscilloscope should be performed by qualified personnel only.

Personal protective equipment such as gloves and goggles is recommended to prevent injury. To ensure worker safety and equipment functionality when using oscilloscopes, this study offers informative suggestions and preventative measures. When working with oscilloscopes, it is necessary to carefully study the features of the model and the manufacturer's instructions. To prevent exceeding the maximum parameters and improper connection, it is necessary to use the oscilloscope within its limitations and purpose. Safety training is important when working with electronics and oscilloscopes. In this way, one can learn about the dangers that may arise and take appropriate measures to prevent harm.

Effective and safe use of electronic equipment such as an oscilloscope requires compliance with safety regulations. It is important to operate the equipment correctly and follow safety rules to prevent accidents. General safety rules when working with an oscilloscope [3]:

- use the device only in the specified way and carefully read the given safety rules to avoid injuries, damage to the product and devices attached to it;
- read all instructions carefully and save this manual for future reference;

- the device should be used in accordance with local and national norms and rules;
- for the correct and safe operation of the device, it is important to follow not only the instructions given in this manual, but also generally accepted methods of ensuring safety;
- the device is intended for use only by qualified personnel;
- only qualified specialists who are aware of the sources of danger in the device are allowed to remove the cover for repair, maintenance or adjustment;
- before each use, check the device with a known source to make sure it is working;
- this device is not designed to detect dangerous voltage.

Conclusion. This article analysed the safety rules when working with oscilloscopes and recommendations on the rules of behaviour with them. Summarizing all of the above:

- an oscilloscope is a device for measuring, observing and recording electrical signal indicators;
- it is necessary to read the instructions before using the oscilloscope;
- the oscilloscope is not designed to detect dangerous voltage;
- it is necessary to study the features of the model;
- use as intended and do not exceed the limits;
- the image should not be reduced to one bright point;
- it is necessary to ground the oscilloscope;
- use only the supplied power cable.

By observing all the above safety rules for working with an oscilloscope, personnel should not be injured, however, if there is a danger to human life or health, it is necessary to immediately notify the management of the enterprise and take immediate measures to prevent possible injuries or negative consequences. In particular, it is necessary to call for medical assistance and, if necessary, provide first aid to the victim. It is also important to ensure access to a medical facility to receive the necessary care and to report the incident to the appropriate authorities for further investigation and avoidance of similar situations in the future.

The workplace must be kept clean and tidy. Provide free access to the oscilloscope and remove unnecessary objects that may interfere with work or cause an accident. Before starting work, check the oscilloscope for damage or defects. Make sure all mechanisms are working properly, for example by calibrating the oscilloscope. So, the goal of the work was achieved, useful tips were provided on the rules of safe use of the oscilloscope.

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