Information on how to construct and improve the State Special Standard of the units of pulsed electric and magnetic field strengths are presented. The need and possibility of extending the time range of the standard in order to ensure uniformity of measurements of the parameters of very short pulses of electromagnetic fields having a pulse length of down to $10^{-10}$ sec are considered.

**Key words:** pulsed electromagnetic field, standard, field strength, very short pulses, extension of the range of pulse lengths.

Pulsed electromagnetic fields (electromagnetic pulses) are accompanied by a number of pulsed processes in nature. The most powerful of technogenic pulses is the electromagnetic pulse of a nuclear explosion. It turns out that such a pulse can disable radio-electronic apparatus over an area with a radius of thousands of kilometers. The problem arises of protecting such apparatus from the action of the electromagnetic pulse of a nuclear explosion.

The international moratorium of 1963 on conducting nuclear tests in three media gave rise to the problem of simulating the individual factors of a nuclear explosion in order to investigate their action on defense technology. The Soviet Union, the USA, and later other nuclear powers, began the intensive development of simulators of the electromagnetic pulse of a nuclear explosion. All forms of armaments, containing radio-electronic apparatus, were subjected to tests for their resistance to the action of standardized electromagnetic pulses, corresponding to the actual electromagnetic pulse of a nuclear explosion. A new fairly extensive class of radio-measuring instruments were developed, designed to measure the parameters of electromagnetic pulses. The bandwidth of the measuring instruments (a pulse edge of the order of $10^{-8}$ sec), the field conditions of use and the presence of high-power electromagnetic noise, which penetrates into the measurement channel, made the problem of measuring the parameters of electromagnetic pulses a difficult one. A comparison of the various devices carried out at the end of the 1970s in the USSR revealed unacceptable differences in their readings. In this context, to ensure uniformity and reliability of measurements, the All-Russia Scientific Research Institute of Optical Measurements of the State Standards Committee of the USSR was commissioned to develop a State Special Standard and a State Checking System for instruments for measuring the parameters of electromagnetic pulses. The Institute now has experience in designing a radiating simulator of the electromagnetic pulse of a nuclear explosion, a number of measuring instruments and high-accuracy checking equipment for instruments for measuring the parameters of electromagnetic pulses. The main parameters and structure of the standard were presented previously in [1, 2]. The development and approval of the standard were completed in 1985 [3].

We chose a step signal as the model of the test signal in the standard and in the checking system. This enables us, in a single experiment, to determine the transient characteristic and conversion factor of the measuring instrument. Standard electromagnetic pulses are reproduced by the discharge of a high-voltage noninductive capacitor into a TEM-cell. This is a
The calibration signal is recorded by a second recording channel, which avoids the need to change the conversion factor when voltage is automatically applied to the input of the amplitude-time converter for self-calibration of the measuring channel.

Surprisingly with an indication of four decimal digits. After measuring and displaying the working signal, a stabilized voltage is then converted in the interval between two light pulses, which are applied to the recorder via a fiber-optic communication line. The interval between pulses is proportional to the signal amplitude. The recorder is a two-channel digital instrument for measuring the intervals with an indication of four decimal digits. After measuring and displaying the working signal, a stabilized voltage is automatically applied to the input of the amplitude-time converter for self-calibration of the measuring channel.

The calibration signal is recorded by a second recording channel, which avoids the need to change the conversion factor when the components age, there is a change in temperature or the batteries discharge (the measuring converters and the recorder have an autonomous supply).

Investigations showed that under these conditions the error in transmitting the dimensions of the units to working standards does not exceed 3%. When transmitting the dimensions of units for field pulses of step form, a stripline measuring transducer is used. The transmission error in this case is also not greater than 3%.

A block diagram of the standard is shown in Fig. 1.