$$\Delta R_{sim}(R_L) = R_{L2}\frac{4\delta}{(1+\delta)^2} \tag{20}$$

The damping coefficient of the communication lines influence is defined as

$$K_{at} = 20\lg\frac{(1+\delta)^2}{2\delta} \tag{21}$$

Structures of resistance simulators with compensation of communication lines influence give the possibility of simulation of resistance on big distances and they can be used for creation of multirange measures of resistance with compensation of the influence of the commutating elements resistance. Such simulators are needed on the objects on which the device can not be placed directly in the place of resistance simulation because of construction or in the zones with aggressive factors, for example on nuclear heating plants with increased radiation which influence on the work of electronic circuits.

REFERENCES

1. В.О.Яцук Принципи побудови кодо-керованих мір опору опору // Вимірювальна техніка та метрологія, 1999, №55.С. 35-43. 2. О.Бойко, П.Столярчук, В.Яцук Переносна багатозначна міра опору // Вимірювальна техніка та метрологія, 1999, №54. С. 39-42. 3. О.Бойко, О.Готра Мікроелектронна багатозначна міра опору, напруги, струму // Вісник НУ "Львівська політехніка", 2001, № 423. С. 31-35. 4. А.с. 836784 (СССР). Преобразователь сопротивлений/ С.А.Новоселова, М.З.Чаповский. – БИ, №21, 1981. 5. А.с. 1173542 (СССР).Многоразрядный управляемый магазин сопротивлений/ Н.Н.Алешин, С.Б.Кутыркин, В.С.Шиндов, Г.П.Шлыков, В.М.Шляндин. - БИ, №30, 1985. 6. А.с.779914 Мера электропроводимости/ В.Я.Яцук, Е.И.Шморгун. - БИ, №42, 1980 7. А.с. 940275 (СССР). Управляемая мера электрического сопротивления/ Г.В.Фабричнев.- БИ, №24, 1982.

Lubomir Sopilnyk[1]

[1] Lvivska Polytechnic, National University Department of metrology, standardization and certification, 12 Bandery Str., 79013 Lviv, Ukraine.

ELECTROMAGNETIC FIELD STRENGTH SENSOR FOR TRAFFIC-SAFETY SECURITY

Keywords: sensor, electromagnetic field strength, traffic safety.

One of the directions of traffic-safety security is reveal registration and inspection of emergency dangerous sections of roads in which electromagnetic field exists. This electromagnetic field influence on psychophysical processes of functioning of driver of motor transport. The connection of the traffic accidents places with revealed anomalous electromagnetic field is confirmed today. To secure the traffic safety there is searching of means of registration of these anomalous (from the point of view of electromagnetic field) sections of roads. For this aim known and elaborated new electrical and electronic means of magnetic field strength measuring and registration are used.

One of the simplest measuring device is the system which includes the receiving antenna, consecutively connected direct current amplifier and generator. But magnetic field strength measuring indicator has low sensitivity which is limited by the level of low frequency background, absence of regulation possibility, absence of light indication what do not provide visual control of electromagnetic field strength level, is not advantageous in exploitation, decreases the precision of estimation of this level, has low noise-immune of supply circuits what do not allow to connect the electromagnetic field strength measuring indicator to autocar net and do not provide the control of electromagnetic field strength level during traffic on motor roads.

Our aim was to create the electromagnetic field strength measuring indicator in which new elements and connections allow to increase sensitivity, noise-immune, advantage in exploitation and thereby increase the accuracy of control of allowable electromagnetic field strength level during traffic on motor roads and to prevent appearing of traffic accidents.

For that aim we elaborated electromagnetic field strength measuring indicator [1] that consists of receiving antenna, consecutively connected direct current amplifier, sound generator, light-emitting diode (LED) indicator of switching, piezoceramics sound transformer, consecutively connected high frequency filter, high frequency amplifier, attenuator, balanced diode-resistor bridge circuit, consecutively connected net stabilizer-filter, reference voltage driver circuit, comparator, matrix LED indicator. The input of high frequency filter is connected with receiving antenna. The output of balanced diode-resistor bridge circuit is connected with the input of direct current amplifier the output of which is connected with another input of comparator. The output of sound generator is connected with the input of piezoceramics sound transformer. The output of net stabilizer-filter is connected with the LED indicator of switching and with other inputs of high frequency amplifier, attenuator, balanced diode-resistor bridge circuit, direct current amplifier, sound generator and with the third input of comparator.

Usage of LED indicator of switching, piezoceramics sound transformer, high frequency filter, high frequency amplifier, attenuator, balanced diode-resistor bridge circuit, net stabilizer-filter, reference voltage driver circuit, comparator, matrix LED indicator and connections between them allow to increase the noise-immune and sensitivity in wide frequency range, the providing measurement of electromagnetic field strength level, light and sound indication and thereby to better exploitation during traffic on motor roads and accuracy of control of allowable electromagnetic field strength level about what the driver is alarmed. As a result the probability of appearing of traffic accidents decreases. Elaborated electromagnetic field strength measuring indicator is given in Fig. 1.

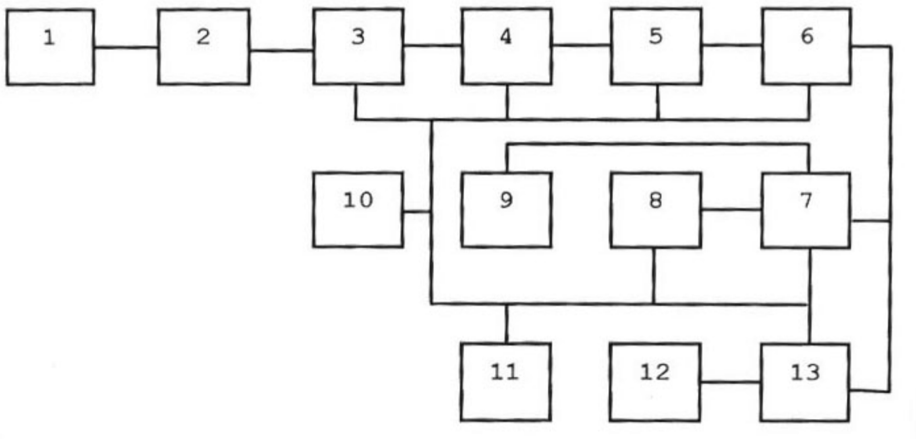

Fig.1. Electromagnetic field strength measuring indicator:
1 – receiving antenna, 2 – high frequency filter, 3 – high frequency amplifier, 4 – attenuator,
5 – balanced diode-resistor bridge circuit, 6 – direct current amplifier, 7 – comparator,
8 -reference voltage driver circuit, 9 – matrix LED indicator, 10 – net stabilizer-filter,
11 – LED indicator of switching, 12 – piezoceramics sound transformer, 13 – sound generator

The principle of work of elaborated electromagnetic field strength measuring indicator is the following. At connecting of net stabilizer-filter 10 to power system the LED indicator of switching 11 is switching what confirms the readiness of electromagnetic field strength measuring indicator to work. The signal received by receiving antenna 1 is going on high frequency filter 2, which is used for suppression of signals with the frequency lower than 5MHz. This filter is needed for decreasing of the level of low frequency signals, which are the background radio radiation. From the output of high frequency filter 2 the signals with frequency higher, than 5MHz enter the input of wide-band high frequency amplifier 3. From the output of high frequency amplifier 3 the signal through regulated attenuator 4 goes on balanced diode-resistor bridge circuit 5, which is used for radio signal detection. The usage of balanced diode-resistor bridge circuit 5 due to its uniform frequency-amplitude characteristic in the wide frequency range allows to efficiently detect the signals with the voltage from 20mV and in comparing with diode detectors usage considerably increase detector sensitivity (at amplitude of alternating voltage from 0,2-0,3V traditional diode detectors are non efficient). Such level of detecting allows to realize the high frequency amplifier 3 on the base of wide-band aperiodic amplifier with low noise factor and to increase the sensitivity of electromagnetic field strength measuring indicator. From the output of balanced diode-resistor bridge circuit 5 detected signals enter the direct current amplifier 6 and than go on sound generator 13 and comparator 7 which in dependence on signal level switch some number of indicators of matrix LED indicator 9. The frequency of sound generator 13 depends on the output signal level of direct current amplifier 6 and is transformed in sound vibrations with the help of piezoceramics sound transformer 12. Comparator 7 controls the work of matrix LED indicator 9. Reference voltage driver circuit 8 provides the work of comparator 7. Net stabilizer-filter 10 is used for formation of necessary stabilized voltage for the work of some units of electromagnetic field strength measuring indicator from autocar net 12 (+1,7; -2)V, also for their protection from noise of this net and supply with erroneous polarity.

REFERENCES

1. Заявка на патент України. Вимірювач-індикатор напруженості електромагнітного поля / Сопільник Л.І., Столярчук П.Г. – № 99063678. Заявл. 30.06.00.