

RESEARCH OF A MULTI - STAGE RECEIVER OF A LASER MICROPHONE

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Abstract

Currently, optical systems are used in different fields of human society very widely. The relevance that the systems depend on optical receivers and transmitters, where the visible and not visible rays of lasers were used. And the laser signal returns from the reflected object very weak and it is required to strengthen and accept it for processing. To do this, we need accurate transmission and receiving systems. This research is directed to use multi –stage sound amplification systems in to the laser microphone.

Keywords: laser microphone. sound amplification, multi–stage, optical systems, cascade, receiver, transmitter.

INTRODUCTON

The main purpose of the work is to compensate of lost signals and amplification. The energy loss of an optical signal due to aerosol and molecular dispersion is one of the main factors that determine the distortion of open optical signals [8,9,10]. From the theory of molecular dispersion of light, expressions are accepted for the dispersion coefficient in the gas follows:

$$\sigma_p(\lambda) = \frac{8\pi^3(n^2 - 1)}{3N\lambda^4} \cdot \frac{6 + 3\delta}{6 - 7\delta} \quad (1)$$

where the N-coativity of molecules per unit volume; N-breed medium index; λ is the length of the radiation wave; δ - the depolarization factor of multiple radiation equal to 0.03.

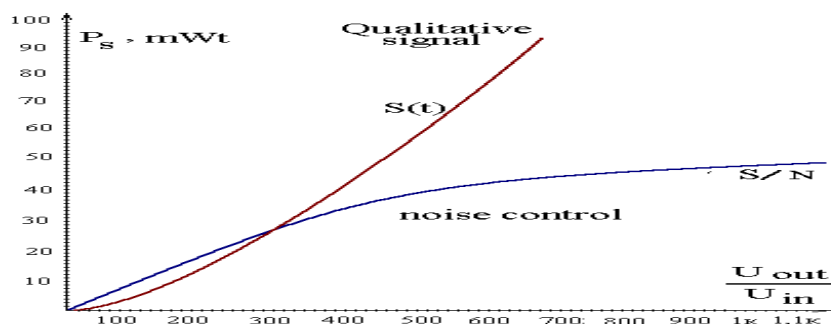


Figure 1. Effects of the noise/signal to quality using multi -stage amplification. (k is the amplificatoin coeficint of the gain).

From the figure, it is visible that with moderate multiplication of the signal to the amplifier of the leading potentials of the useful distortion signal increases[3,4]. Also, with moderate multiplication of the signal by the amplifier, the signal / noise parameter increases, that is, the noise of the amplifier adopted by the input signal also leads to a distortion of the signals [7,11,13].

Although, looking at the shortcomings, using multi -stage amplification in laser microphones, it gives a good result.

To say that confidently reception and intelligibility in some order is specified.

The device is a scheme of the investigator of the recruiter based on multi -academic benefit. It consists of: pht - phototransistor block; S - power sources, amplifiers 1, 2, 3 cascades; Light source is a laser. [14,15,16,]. The directory beam begins with the transmitter and reaches the reflective object, the reflected beam is accepted by the beam detector. It depends on the intensity of the taken beam, as well as the distance. Plus, to this weather, the condition and quality technique contribute to the desired signal receiving [2,5].

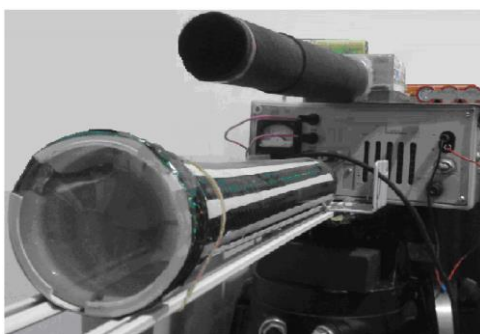


FIGURE 2. MAIN VIEW OF THE RESEARCHABLE LASER MICROPHONE

LITERATURE REVIEW

Reading “Calculation of the reliability of the line of atmospheric optical connection” understandable the details which conducted calculation of influences to laser beam. A main practical meaning of the work described at the unique work of monography [7]. Paying attention to the similarities in the physics, principle of operation and structure of the optoelectronic photo converter, the inventions published in works [2,4.6] can be cited as the closest devices to it. When taking, effectiveness in many respects depends on the receivers and the transmission of the laser beam. And from a confident signal, also from the focus of the laser beam. Also, we can talk about the dangers of a laser beam on the human body, including the eye [7]. Based on this, it is necessary to judge the impossibility of increasing the power of the laser. And does not increase the reinforcement factor, since there are distortions and other noises. The case requires digital processing, as we consider in another part of the work.

METHODOLOGY

The developed receiver of the remote laser microphone is made of two main parts.1. Receiver for admission (converter); 2. Amplifiers of the converted signals [2,6].

As a converting device, we use a photocell (photo transistor), it is installed in device 1, it allows to receive an electrical signal. (desire of the signal). We can see it in photo, so this can affect the device of quality characteristics. [2]. This applies to obtain information about a distant object. On the axis of receiving the beam of the transmitter [2, 3]. The installation consists of a power supply (PSU), laser emitter (LZ), 1 wow of an amplification cascade (1K), 2 wow of amplification (2K), 3 stages of amplification (3K), a power source (S) transmitter, phototransistor (PhTR) . With the spread of an optical beam in the atmosphere, the atmosphere ingredients affect it. By the influence of the nature of the atmosphere on the optical signal, the beam is subject to a significant quantitative and qualitative change in scientific operation [5,6]. In the monograph of 2017, the author had an explanation of development operations. Under the theme “Analysis and study of the influence of microelene particles of the atmosphere on attenuation of the optical signal power” [1,13] were considered the problems of open air optical communications.

RESULTS AND DISCUSSION

The structure of an optoelectronic photo converter

The block diagram of the device design is shown in Figure 3. It consists of two parts.

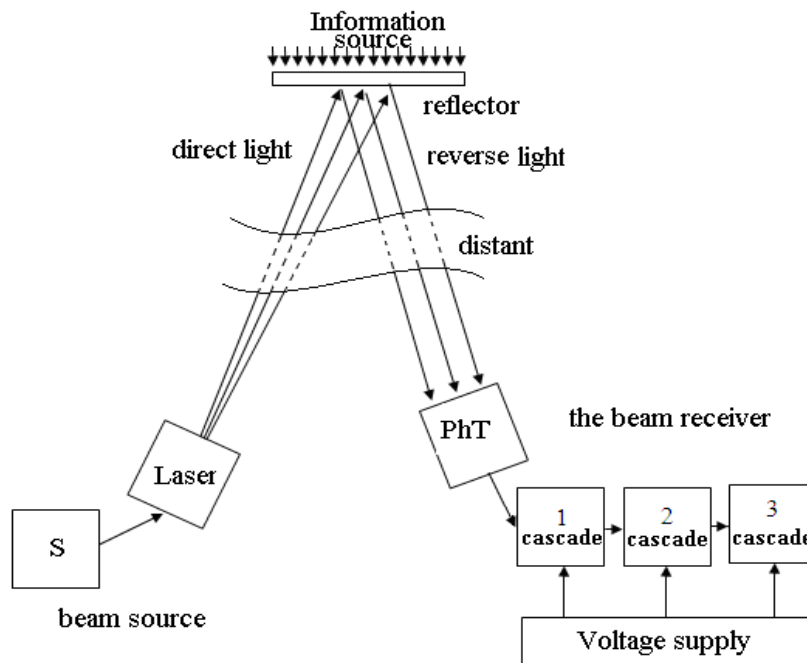


Fig.3. Block diagram of the multi-stage receivers for the distance microphone.

- S - supply
- Laser – radiator of the beam;
- PhT - Phototransistor;
- n cascade – number of cascads;
- Voltage supply – parallel DC;
- Reflector - object of the information;

CONCLUSION

The device consists of two parts. Its first part is a closed electrical circuit consisting of a photocell and a laser generator. The developed distance laser microphone mainly processes a modulated signal. However, the attitude signal /noise is so low, the useful signal is difficult to distinguish. Therefore, a lot of cascading amplifier-receiver was proposed and used, intelligibility is much improved. The device mainly consists of two main parts. Receiver and transmitter. The use of a lot of cascading amplifier with high filtration quality is given at work [2,4,7]. The introduction of an electro-optical system working with accurate light into the device increases its sensitivity and measurement accuracy several times. The use of an electric field instead of a current in the device ensures high energy efficiency. It can be applied to all areas of the measurement and control system, which is independent of the device and technology.

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