A DEVICE FOR MEASURING THE LINEAR DIMENSIONS OF THE PALLET BY ECHOLOCATION METHOD

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The device is designed to measure the linear dimensions of pallets under for packages of beer bottles. The aim of the measurement is the identification of rejects by a number of criteria. The measurement principle is based on the echolocation method with the help of ultrasonic pulses. The echolocation method is based on radiation and receiving the reflected sounds to detect objects in space, as well as information on the properties and size of the objects. The sensors are designed as separate combined searchers working at a frequency of 40 kHz. The block diagram of the device is shown in Fig.1

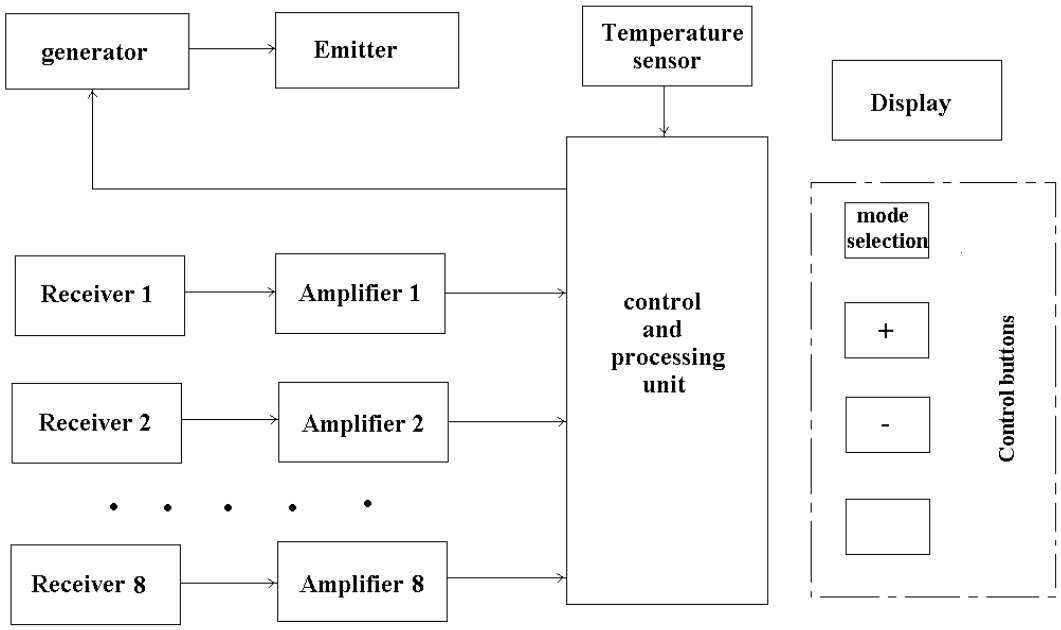

Fig 1.Block diagram

The device will contain eight measurement channels. Each channel contains
– ultrasonic generator;
– transmitter;
– receiver;
– amplifier;
– an interface with a microcontroller.

Each ultrasonic generator stage comprises a transistor operating in a switching mode. To avoid inter-channel interference the generator switches alternately. The generator is located on the same board which is mounted in a metal housing. A twisted pair of wires in the screen provides the connection to the radiating elements.

The receiving and emitting transducers are spaced about 10 cm. Apart. Each of them is placed in a special cone concentrator. This performance is caused by two factors. Firstly, the area provided by the audio control zone is reduced, which improves resolution. The increased concentration of the acoustic field increases the response signal. Secondly, there is a sharp decrease in the parasitic coupling between the receiver and generator. This construction is fixed on a metal plate so as to provide a slight change in the geometry of the acoustic rays. This is required to collimate the radiation. At the same time the metal plate serves as a bottom of the metal casing that protects the package from environmental influences.

The amplifier of each channel is assembled on a separate board that is located in a separate metal housing. This is necessary to eliminate the co-channel interference within the electron path. The input stage is a differential amplifier assembled on transistors VT1 ... VT3. The second stage is a band-pass that ensures the inclusion of the collector circuit in oscillation circuit elements L4, C3. This combination significantly reduces the noise caused by high-power operation of electrical machines. The third stage is the process of harmonizing the analog part of the receiver input circuit with a microcontroller. An amplitude detector is placed at its output, which increases the comfort of adjusting operations.

Thus, the method of ultrasonic echolocation can be used to determine the linear dimensions and properties of the tested pallets. The sensor has been designed and assembled. The prototype of the device is going to be built.

REGULATION OF TECHNICAL STANDARDS OF DIGITAL RADIOGRAPHY: LITERATURE REVIEW

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Currently, radiographic control technology develops rapidly. Modern digital technologies supplant film radiography step by step. There is