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SOVIET RADIO AMATEURS SERVE THE NATIONAL ECONOMY

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Radio engineering continues to increase its scope to include new fields of the national economy. The significance of this growth is indicated in the results of the Seventh Radio Correspondence Exhibition. As compared with previous exhibitions, the number of exhibits showing the introduction of radio methods in other fields of the national economy has greatly increased. On display are devices which make it possible to determine the moisture of grain, test the quality of fabric dyes, detect metallic objects in ore, measure the thickness of scale in steam boilers, determine the quality of the machined surface of articles, etc.

Despite this variety, the number of similar exhibits is very small. This indicates the richness of creative thought in our radio amateurs. It is no exaggeration to say that there is not even one field of national economy where some form of radio engineering techniques cannot be applied advantageously.

Take, for example, the problem of measuring grain moisture. Nowadays there are instruments for measuring the moisture of grain and other dry substances. Among the successful devices of this type is the practical apparatus made by Ye. Velichko, a radio amateur from Krasnodar. However, such problems as determining moisture in the ground, air, wood, and various finished goods have not as yet been fully solved. Existing methods are either complicated, expensive, or not sufficiently accurate.

To measure the moisture of wood, for example, a piece of given dimensions is cut off the board or log, weighed, dried for 8 to 10 hours in a special drying cabinet and then weighed again. It is obvious that such a method not only requires a great deal of time and wastes wood, but does not aid in determining the moisture of the finished article. A device which utilized radio techniques might eliminate these drawbacks.

The apparatus built by A. P. Kissel' in Nizhniy Tagil and P. M. Trifonov in L'vov are other examples of the successful use of radio methods. Comrade Kissel' built an apparatus to detect iron objects which accidentally fall into the ore moving on the conveyer belt to the crushers. Its working principle is very simple.

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The conveyer belt on which the ore is carried runs inside a coil forming part of the oscillatory circuit of a high-frequency generator. If any iron object falls into the ore, the inductance of the coil varies during its passage through the coil, producing a variation in the frequency of the generator. This frequency change is registered by an indicator -- an ordinary radio receiver tuned to the generator frequency -- which gives the proper signal and stops the conveyer.

Comrade Trifonov's apparatus for measuring boiler scale operates in the following manner. A metallic insulated plate is placed close to the inside wall of the boiler or pipe. This plate, together with the wall, forms a capacitor which is part of an oscillatory circuit of a high-frequency generator. As scale forms on the boiler walls, the capacitance of the capacitor changes, causing a change in the generator frequency. It is then possible to estimate the thickness of the layer of scale by the degree of change in the generator, and to take proper steps to clean the boilers.

Possibilities of utilizing radio engineering methods are, of course, not limited to the above apparatus. Such methods can be used for registering and measuring pressure, rate of movement of steam or gas, thickening, thinning and deformation of various parts, sorting objects according to dimension or material, determining the density of solutions, etc.

The utilization of photocells opens great possibilities, such as checking the quality of fabrics (device made by A. A. Varypyev, a radio amateur in Gor'kiy), or their degree of bleaching (N. N. Alekseyev, Ivanovo City). Photocells can also be used for counting or sorting objects on a conveyer, checking accuracy of manufacture of various parts for automatic control of machines, and many other purposes.

It is, of course, possible to use a photocell to construct a "light telephone" in cases where laying a cable or overhead line is difficult and the use of radio communication is not advisable.

Another field in which the ingenuity of the radio amateur can be employed profitably is that of electrical measurements of nonelectrical quantities. Intensive research is being conducted in all branches of our national economy on development of automatic control in production processes. Such control demands not only measurement of such nonelectrical quantities as temperature, pressure, stress, velocity, but transmission of the results to a remote location, such as a dispatching point.

A manometer, for example, indicating the steam pressure in a boiler, must be about 10 meters from the boiler. The steam pressure acts upon the transmitting element, which is an electrical device capable of changing its properties under the action of mechanical pressure. The voltages at the terminals of the transmitting elements are proportional to the magnitude of the pressure. Since these pressures are usually very small, they are first delivered to an amplifier, the output of which is connected to a milliammeter graduated in pressure units and installed in a control desk.

Other methods than that described above may also be used, but the principle is the same: a nonelectrical quantity is converted into an electrical quantity (voltage, frequency, current), which is then subjected to some other alteration in the form of amplification, modulation, detection, pulse formation, etc., and is thereafter carried to a measuring device or indicator.

In some cases, radio communications must be employed to transmit indications from more or less inaccessible places or from moving objects. Thus, automatic radio transmissions are used for meteorological data from radiosondes, for the work of automatic polar stations, etc.

But although such problems as measuring the dryness of wood or the surface hardening of steel by high-frequency currents have been sufficiently clarified by now, almost no study has been devoted to the utilization of such currents for conserving and processing food stuffs, seed irradiation, etc. There is no doubt that many processes and measurements in these fields could be speeded up and improved by employing radio methods.

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