ELECTRONICS

Music Coded By Pulses

This new form of radio transmission is called pulse modulation and resembles telegraphy. It eliminates noise arising in transmission and gives good sound reproduction.

➤ MUSIC and voices can now be sent over the radio waves by a method which closely resembles telegraphy.

Pulse modulation, the new form of radio transmission, is being developed in the electronics laboratories at Massachusetts Institute of Technology by B. D. Smith, working under the supervision of Prof. William H. Radford. Similar studies are also being conducted in other parts of the country, notably in the Bell Telephone Laboratories.

Sounds to be "sent over the air" are coded, each sound wave amplitude being represented by some number on the binary scale, which is a number system using two as a base. An example of this system is the way shop mechanics measure distances in inches, half inches, quarter inches, and so on.

The name pulse modulation comes from the fact that the coding into binary numbers is done by pulses of electricity shown on a cathode-ray oscilloscope. There are five consecutive pulses of electricity in the model now being tested at M. I. T. In numbers on the binary scale this means that there are actually 32 separate numbers which can be represented; this gives 32 separate amplitude levels.

A beam of light may cross the oscilloscope screen at any one of 32 levels which are determined by the in-put voltage. A coding plate is put in front of the screen. This plate, which looks like a black card with transparent lines of varying lengths on it, transforms the picture on the oscilloscope into a series of flashes of light. These flashes are taken up by photoelectric cells and sent over the air as radio impulses. The whole picture on the oscilloscope is scanned once every ten-thousandth of a second.

These impulses reach the receiving apparatus, where they are converted into voltages. The amount of the voltage depends on what time during the ten-thousandth of a second the impulse arrives. In this manner the picture of the sound wave on the screen of the cathode ray oscilloscope is reconstructed in the receiving apparatus and the sound is reproduced through a loud speaker.

Since the sound is transmitted as a series of dashes the resemblance of this apparatus to telegraphy is marked. This pulse modulation system eliminates to great extent any noise which might arise in transmission and gives excellent sound reproduction. The final form of the apparatus is also expected to be quite inexpensive.

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TECHNOLOGY

Exposure Time of X-Rays Reduced by New Screen

➤ EXPOSURE time for taking an X-ray picture will be cut in half with use of a new high-speed X-ray intensifying screen now in production by the DuPont Company, Wilmington, Del.

Most important of the many advantages this offers is the decrease in time necessary for the exposure. Since there is a limit to the amount of X-radiation that can be given, doctors are careful to expose a person as briefly as possible in taking pictures for diagnosis. This is particularly important if the patient is likely to need X-ray or radium treatment later. Difference between the new screen and present-day screens is in chemical composition. The new screen is made possible by use of a luminescent chemical new to the field, barium lead sulfate. This chemical is stable under both X-rays and light rays.

Calcium tungstate is the chemical which has previously been used as the principal component of intensifying screens for X-ray pictures. The new screen extends the distribution of fluorescence from 2800 angstrom units to 4600 angstrom units, with the maximum response at 3800. This is much further into the ultraviolet than the calcium tungstate screens extend.

The new screen should reduce the costs of X-ray pictures because it will increase the capacity of smaller X-ray outfits, such as portable ones, will save the tube life in the big machines and will take more pictures in the same time

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***UNIQUE MEASURING DEVICE**—A gauge for measuring the thickness of thin rubber and other thin films on continuous production equipment, has at its heart a radioactive isotope, byproduct of the nation's atomic energy plants. Shown in the picture is W. E. Morris, who developed it in the research laboratory of the Goodyear Tire and Rubber Company. It is capable of measuring material as thin as one-thousandth of an inch.*