SCIENCE NEWS

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RADIO TRANSMISSION

A NEW method of radio transmission and reception which should have important application in airplane radio and international broadcasting was reported to the recent meeting of the Institute of Radio Engineers by Murray G. Crosby, engineer of the Radio Corporation of America.

The new system, known technically as phase modulation, enables a transmitter to broadcast four times as efficiently as those in present use. This fourfold power output with present equipment can be used either to get stronger signals at a distance—as in international broadcasts—or to get signals of present strength with less cumbersome and heavy equipment. This last is the significance of the new advance for aviation communication. It is not believed that the new advance in the radio art will affect standard broadcasting since most effective reception requires specially built receivers. These would not need be much more expensive than present types, but the total cost and inconvenience of a mass change-over would militate against such a change.

The system of phase modulation is essentially different from the existing method in which amplitude modulation of the signal is employed. In amplitude modulation the voice or other sound on the radio wave increases or decreases the strength of the signal in accordance with the undulations of the sound that it carries. In the new phase modulation system, the radio signal is always of constant, maximum strength. The variation, or modulation, of the new waves is accomplished by shifting the electrical oscillations so that they precede or lag in their normal frequency of occurrence. The varied signal is thus a bit out of phase, and hence the term phase modulation for the method. Mr. Crosby pointed out that phase modulation is itself no new thing but it has taken ten years of laboratory research to obtain a practical method of generating and utilizing the waves to the best advantage.

VITAMIN B_1 INJECTIONS IN ACUTE NEURITIS OF LEPERS

RELIEF from the pain of neuritis, which accompanies some cases of leprosy, has been achieved through studies made by members of the U. S. Public Health Service at its Honolulu station. Drs. L. F. Badger and D. W. Patrick, of the Leprosy Investigations Division in *Public Health Reports*, indicate that injections into the muscles of solutions of vitamin B_1 produce relief from pain.

Lepers with acute neuritis were sometimes in such pain that it was almost impossible for the physicians to make an adequate examination of the swollen nerves because the patients could not permit their bodies to be touched. Such victims were given relief in some cases within 24 hours. And in all but one patient relief came within three or four days.

In the tests at the leper colony in Hawaii the physicians used 59 patients split into four groups. One group received vitamin B_1 by drinking pineapple juice containing brewer's yeast, which has a relatively high content of the vitamin. Another group took their vitamin B_1 in concentrated form by mouth. A third received the concentrate by intra-muscular injection. The fourth group served as a control and did not receive special doses of the vitamin.

While the number of patients receiving the injections were small (only 10) the results were amazing. It is planned to continue the study on a much larger group of cases. A discussion of the results reads: "The results obtained in the few cases of acute leprous neuritis reported strongly suggest that material benefit is derived from intramuscular injections of vitamin B_1. Experience also suggests that similar results are not obtained by oral administration of that vitamin. No improvement was noted following administration, for over a 6-month period, either of large doses of brewer's yeast or of vitamin B_1 concentrate. On the contrary, acute neuritis developed after the vitamin B_1 concentrate was given (by mouth), in one case for 6 months and another for 8 months."

Comparison of the new injection treatment with other methods used in the past, shows a marked decrease in the time needed for relief. One patient in the test had previously had an attack of acute neuritis which persisted for 24 days when treated by former methods. In a new and severe attack, the injections stopped pain after three days and tenderness after four days.

THE BENEFITS OF AIR CONDITIONING

THE benefits of air conditioning in office buildings in summer continue after the workers leave their desks, it was shown in studies reported at the recent meetings of the American Society of Heating and Ventilating Engineers.

Reporting on reactions of 274 office workers to air conditioning, and whether they withstood the heat better than their less fortunate friends who worked without benefit of air conditioning, F. C. Houghton, A. B. Newton, R. W. Qualley and Edward Witkowski showed that over 72 per cent. withstood hot weather better than if they had not enjoyed air conditioned comfort during their working hours. Fifteen per cent. of the replies reported no difference, while about 13 per cent. said that they did not withstand the evening heat as well as those who had had to work, all day, in heat and humidity. Asked whether they noted a definite feeling of the warmth immediately after leaving their air-cooled office, over 35 per cent. said they noted no difference. Thirty-five per cent. said they had a feeling of warmth. Twenty-two per cent. added that this hot feeling lasted less than 20 minutes, 6.6 per cent. said it lasted less than an hour and 6.6 per cent. felt it for a few hours. Over 12 per cent. noted this warm feeling all night. Some 17 per cent. gave no intelligent answer to this question. The votes showed about a two to one ratio for benefits versus dislike for air conditioning. Sixty-six per cent. replied favorably with some 34 per cent. of these replying that it was more comfortable and

pleasant. Another 27 per cent. thought they worked more efficiently, while 3.6 per cent. reported "more pep." About one per cent. reported that they had fewer colds. From the 31.7 per cent. replying adversely, 19.2 per cent. said they were too cool and that at times it was drafty. Four per cent. stated that they were too warm. Reports that it was too stuffy and too humid totaled 2.7 per cent. each, while 3.1 per cent. reported that they contracted colds.

The engineers, who represent the society's research laboratory in Pittsburgh and the Minneapolis-Honeywell Regulator Co., believe that the questionnaire serves a useful purpose in indicating a large percentage of general satisfaction to air conditioning and the lack of severity and importance of the hot reaction upon leaving the air conditioned space. It is logical that this should be the case, since it is generally recognized that the unsatisfactory reaction of the human body to an extended hot spell is a cumulative effect.

THE DEAF CHILD

THE newest ways of helping deaf children were discussed at the Detroit meeting of the American Association to Promote the Teaching of Speech to the Deaf. It was stated that it is far less tragic for a child to have defective hearing now than a generation or two ago. So much more can be done. Statistics show that 1,600,000 children in the United States, or six out of 100 of school age, have defective hearing. Of these, 300,000 are seriously enough affected to need help by reading a speaker's lips.

Under discussion at the conference was an invention from South Africa, which an engineer has devised to teach deaf children to talk naturally, instead of in a dull monotone. The invention, used successfully in South African schools for the deaf, looks like a box. At one side is a vertical string of fourteen light bulbs, gay colors. On the front of the box is a green blackboard. The teacher writes "Good morning" on the board, and draws a curve to show how the voice should rise and fall. The deaf child says, "Good morning," and the colored lights flash to show the pitch of his voice. Electro-magnetically operated tuning forks operate the device. The top four and bottom two lights are red, meaning danger—voice too high and shrill, or too low and gruff. The inventor of the device is A. E. Coyne, instructor in engineering at the Cape Technical College. The invention is mainly for the totally deaf child, who has no way of hearing his own speech defects.

Helping the child to "hear" by feeling the vibrating bones of a speaker's head is another recent development which was discussed, and demonstrated. At the Detroit Day School for the Deaf all incoming classes are taught to feel speech. Children who have little or no hearing, can not get help from mechanical devices. They can, however, learn to "hear" what a speaker says by casually placing a hand almost anywhere against the speaker's cheek or on his head.

Efforts to salvage what hearing the deaf or hard-of-hearing child may have was another topic of the conference. It is now realized that the hearing of many a child who seems totally deaf can be trained and improved, whereas, if neglected, the child does in truth become deaf.

Notable improvement in instruments to aid hearing is arousing much interest. There is prospect that such instruments in general use will attain the efficiency of eyeglasses, enabling those who can be helped by an instrument to hear clearly and easily.

PAPERS READ BEFORE THE AMERICAN SOCIETY OF AGRICULTURAL ENGINEERS

RAPID growth of farm electrification was predicted by speakers before the meeting of the American Society of Agricultural Engineers held recently in Pacific Grove, Calif. Less than a fourth of the farms able to use electricity are actually using it now. The barrage of sales effort that has been in effect during the past few years is proving beneficial to all concerned, in the opinion of E. G. Stahl, of the San Joaquin Light and Power Corporation. "Unquestionably," he stated, "the large volume of propaganda put out by the Rural Electrification Administration has lessened sales resistance, which has materially benefited the private utilities in their rural service expansion program." The extent of private power companies' activity in the rural areas is indicated by the servicing of approximately 300,000 rural homes by private companies during the two years ending December 31, 1937, while the R. E. A. installations amounted to only about 33,000. Mr. Stahl expressed the hope that public and private interests will cooperate more closely, for future benefits to the consumer. Possibilities for further expansion were emphasized by George A. Rietz, head of the rural electrification section of the General Electric Company. He pointed out that although electrified farms have increased in number from 200,000 in 1926 to more than 1,250,000, there are still 5,250,000 American farms that have not been electrified.

MANIFOLD uses for electricity on the farm were discussed by other speakers. Electrically operated pumps deliver millions of gallons of water every minute to California's irrigated fields and orchards, and electric irrigation is taking hold even in the East and Midwest. Paul Ford, of the Pacific Gas and Electric Company, told of a huge outdoor brooder on a turkey farm, where 4,000 feet of soil-heating cable, buried in sand, "mothers" 9,000 turkey chicks at a time. Thus far this year, 26,000 turkeys and several thousand chickens have been raised in this brooder. E. M. Mrak, of the University of California, described the systems now in use in the leading dehydration plants in California. Electricity is used both for heating the fruits and for driving currents of air over them to carry away the moisture.

A NEW type of cotton picking machine was described by E. A. Johnston, vice-president of the International Harvester Company. The new machine has two revolving cylinders, each bearing 154 spindles. Unlike the much-discussed Rust cotton picker, the new International machine has tiny barbs on its spindles. As they whirl, the barbs catch the cotton fibers and pull the ripe bolls

out. The spindles then pass devices called "doffers" which take the cotton off them and drop it on a conveyor belt. Machine harvesting of cotton may bring changes all along the line in the cotton-growing industry, Mr. Johnston pointed out. The very shape of the cotton plant itself may be changed by breeding, to permit readier operation of the mechanism. Probably no picking machine will be built in the immediate future that will pick cotton as cleanly as human fingers do, but this is true of all kinds of harvesting machinery. Just as grain-handling machinery has been evolved to take care of the "mistakes" of reapers, so future developments in gins and cotton-cleaning machines may be expected to be adapted to new factors introduced into the industry by mechanical cotton pickers.

FIELDS rebuilt into terraces by powerful earth-moving machinery will yield the better crops of cotton demanded by the steel-fingered pickers of the future. Eugene C. Buie, of the U. S. Soil Conservation Service, reported solid profits obtained by terracing farm lands on the Southern High Plains. Experimental data indicate that the available soil moisture which can be utilized for plant growth may be increased as much as 50 per cent. as a result of level terracing with contour tillage. This increased available moisture has shown an average increased production of lint cotton for an eleven-year period sufficient to pay the initial cost of land at $50 an acre, the cost of the terracing, and still have money left over for dividends. Level terraces on wheat land with less than a one per cent. slope have shown an increased net income above the cost of terrace construction of $1.75 per acre for a ten-year period and on grain sorghums an average of $838.40 per section increased income as a result of one year's observation over approximately 5,000 acres."

PALE blue light proves a fatal lure to the grape leafhoppers, a serious pest in vineyards, as reported by J. K. Ellsworth, of the University of California. Females of the species responded most readily to the light. Counts of large sample catches showed 88 per cent. female insects. Many light colors were experimented with, before the attractiveness of pale blue was discovered. Other colors attract other insects. The lights have also been used as an easy means for obtaining insects to feed to laboratory animals. The lights lure the flying victims. When they arrive at their goal, they fly against high-tension wires that kill them instantly.

ITEMS

THE Connecticut Experiment Station has announced that the Mexican bean beetle can now be combated with sprays that kill the insects without leaving poisonous residues dangerous to man. The sprays are based on derris, pyrethrum, and other plant products that have been successfully used against flies, mosquitoes, and other types of insects, but have not hitherto been employed in the bean beetle fight.

ISLAND authorities at the British Mediterranean naval base at Malta have turned to systematic pasteurization of goat's milk in an effort to wipe out Malta fever. One pasteurized goat's milk distribution center has already been opened at Hamrun, two miles from Valetta, the main town. Distribution methods similar to those used for cow's milk are to be used. Malta or Mediterranean fever is caused by a germ transmitted by unsanitary goat's milk. Prohibition of the import of Malta goats into Gibraltar years ago wiped out the disease in the latter British station and its elimination from the diet of troops and sailors stationed at Malta has wiped out the disease among the island's military personnel.

GARNET and tourmaline, staurolite and zircon, and a host of other heavier-than-average semi-precious stones now have a new use—telling the age of mountains. In the Big Horn Basin in Wyoming, Dr. Marcellus H. Stow, geologist, of Washington and Lee University, is tracing the source of the ancient sediments back to the still more ancient mountains from which they came. Piled one over the other, with the youngest on top and the oldest below, the Cretaceous and Eocene sediments of the area were derived from the wearing away of the highest of the ancient Rocky Mountains. Thus, the Hell Creek beds contain abundant zircon in all samples, suggesting their origin from a zircon-containing mountain. They contain no hornblende, showing that the source of the sediments was hornblende-free. Further studies show that the Hell Creek beds were derived from the erosion of sediments. Each bed of the series present in the Big Horn Basin was likewise studied for heavy minerals, and its probable source determined. From this, Dr. Stow hopes to determine which areas were "up" during each phase of the Laramide period of mountain-building, 90,000,000 years ago, more or less.

SEEKING to cut down the rate of wear on steam turbine blades, which rotate at high speed under the impact of a steam jet, engineers of the Westinghouse Electric and Manufacturing Company have been subjecting bits of metal to an erosion test that duplicates in a few minutes the wear of years. Under R. E. Peterson, manager of the mechanics division, engineers have been directing a stream of water at the same pressure as water running from a kitchen tap against bits of metal whirling at a speed of 13 miles a minute. Three minutes of such treatment cuts a deep, jagged notch into the metal, an effect a dripping faucet might take years to duplicate. The study is a part of a research program aimed at strengthening metals by analyzing their wearing and fatigue characteristics.

A RADIO CLOCK, built either as an auxiliary or as an integral part of an otherwise ordinary radio receiver, has been patented. Designed by Walter van Braam Roberts, of Princeton, the device as described tells time to the nearest five minutes, but can be modified to tell time to the nearest minute and second. Controlled by a master clock at the radio station, signals are sent out at the selected interval. The signals consist of low frequency modulations, below the range audible to the human ear. Received by the receiver at the same time the regular program is coming in, the signals cause reeds to vibrate. The reeds in turn permit to pass or do not permit to pass a beam of light directed toward a screen. The position of the light beam indicates the time. The patent has been assigned to the Radio Corporation of America.