

PHYSICS

Very Short Radio Waves Travel Record Distances

Warm Air Over Colder Masses Called Cause of Unusual Transmission at Harvard of Waves Under 3 Yards Long

VERY short radio waves, only a few feet in length, have traveled record distances in Harvard experiments and warm air currents riding above colder air masses are believed to be responsible.

Using a $1\frac{1}{4}$ meter wavelength, signals have been exchanged between a Cambridge experimental station and one at Mt. Wachusett, Mass., a distance of 68 miles and probably a record for $1\frac{1}{4}$ meter transmission.

Another record for $2\frac{1}{2}$ meter transmission, is believed to have been established in the exchange of signals by the Blue Hill observatory and a station on Mt. Washington, N. H., a distance of 142 miles.

These unusually successful results are probably due to temperature inversions, according to Prof. Charles F. Brooks, director of Harvard's Blue Hill meteorological observatory, who has had a leading part in the university's ultra-high frequency radio research.

Ordinarily, air temperature drops with increase in altitude, temperature inversion occurring when the regularity of this fall in temperature is interrupted. Inversions are common at night, when the lower air is chilled. They are also caused by a warm current of air flowing above cold air near the earth or by a unusually cold current flowing close to the ground under warmer air at a moderate height.

There is a possibility of temperature inversion at four levels, says Prof. Brooks; in the Kennelly-Heaviside region; at the base of the stratosphere; in the middle of the troposphere; and near the ground. Only the last two, however, seem to be of consequence in ultra-high-frequency transmission.

It is Prof. Brooks' theory that when a temperature inversion occurs, the radio waves which spread horizontally through the atmosphere are refracted in passing from cold or relatively dense air into a layer of warm or light air. This refraction is similar to, but very much less than, the refraction of a

beam of light which passes from water into air.

Additional observations by G. W. Pickard, research associate at Blue Hill, on transmission and reception of 5 meter wave signals, showed that there is a well defined daily change in signal strength, with good reception during the night, best reception during morning and evening, and poorest reception near noon. His automatic records also indicate that there is probably a seasonal fluctuation, with best transmission during the summer.

The usual summertime inversion of temperature over the cold waters off the coast of Maine is believed to have been responsible for two exceptionally long distance transmissions of 5-meter signals last summer.

One was a signal sent from Blue Hill and picked up in a boat off Mount Desert Island, Me., more than 200

miles away. Later in the summer, 5-meter signals from West Hartford, Conn., were received on Mt. Cadillac, Mount Desert Island, Me., a distance of almost 300 miles.

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PHYSIOLOGY

Boy With Hairy Coat Studied in Kharkov

A SO-CALLED "dog-boy" like the famous Jo-Jo exhibited by Barnum many years ago is living in the city of Kharkov, U. S. S. R.

The child is entirely covered, face and body, with long blond hair having somewhat the texture of goat hair, coarse and a little wavy. He is being studied in the children's hospital and clinic in Kharkov.

The child is now four years old and according to the last report is in good health except for a case of rickets for which he is being treated. He is normal mentally as well as physically. Both parents and the boy's older sister are normal in every respect and no similar condition has occurred in any member of the family on either side, so far as the parents know.

The condition is known to scientists as hypertrichosis universalis. It is a con-



RARE DEFECT

This little lad, like Barnum's famous Jo-Jo, suffers from an inherited defect.

genital defect like harelip and is thought to be due to an arrested development of certain structures of the body. The first hair coat, which covers the body of a child before birth and is usually shed soon after birth, persists in cases like this of the Russian lad. The development of nails and teeth may also be faulty, and one authority questions whether such persons ever get a set of permanent teeth.

The condition is very rare. Perhaps not more than 30 unrelated families

having it are known. Most of the cases have been reported from Russia. In the Russian cases the hair is light, while in cases reported from India the hair was dark. Previous studies show that once the condition appears, it will very probably appear in the next generation.

The Kharkov boy's chances of making a living by appearing in circus side-shows is slim, because the Soviet Union does not countenance exhibitions of this sort.

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PHYSICS

Ultraviolet Rays Audible With New Detecting Device

Old Tin Can and Jet of Water Used by Scientist To Determine Strength of Invisible Rays

AN OLD tin can, a bit of old rubber sheeting, a water jet, and a spark gap are essential parts of a new ultraviolet detecting apparatus developed by Dr. R. D. Summers of the physics department of the University of Pennsylvania (*Review of Scientific Instruments*, February).

With the simple and inexpensive equipment it is possible to hear the presence of the soundless and invisible rays which cause sunburn and likewise prove the presence of the still more piercing radiation from radium.

Dr. Summers took an old tin can, cut out the top and bottom and mounted a piece of rubber sheeting across one end. Placing the can on its side he directed a fine stream of water against it. When no vibrations were present the water jet hit the rubber and flowed silently to a collecting trough. Vibrations, however, make the water stream strike with less smoothness and—like the string and can telephone systems of boyhood—the sound comes out as a rattle and chatter.

The same sounds issue from the can when a source of ultraviolet light or radium rays is brought into the vicinity of the apparatus.

So sensitive is the device that the ultraviolet light from a match held several yards away can be detected.

The frequency of the clicks issuing from the apparatus, Dr. Summers finds, is a measure of the intensity of the ultraviolet light or of the radium rays.

Immediately adjacent to the water jet is a spark gap connected to a 2,000 volt source obtained from a small transformer like those used in lighting neon advertising signs and passed through a rectifying radio tube to convert it into direct current.

The spark gap is adjusted to a distance where the spark is just unable to jump the gap. Attached to one spark gap terminal is an electrode set close to the stream of water issuing from the jet. Being charged to 2,000 volts it attracts the water stream slightly.

As ultraviolet light or radium rays fall on the copper terminals of the gap electrons are emitted and the conductivity of the gap cut down. At the same time the electrical voltage on the gap is decreased. Hence the attraction of the terminal for the water jet is varied and the stream falls on a different place on the rubber sheet of the tin can.

It is the minute varied spraying of the water stream on the rubber—like a gardener watering a lawn—which creates the tell-tale sounds and thus detects ultraviolet light.

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The birthrate in England and Wales in 1933 was the lowest in the records of those countries.

Waterfowl that get their feathers soaked in oil-polluted water are apt to die from cold, starvation, or drowning.

PUBLIC HEALTH

Big Increase Reported In Scarlet Fever

MORE cases of scarlet fever are being reported to the U. S. Public Health Service each week this winter than at any time since 1928. The increased prevalence of this disease is widespread. Over one hundred new cases were reported during one week from each of sixteen states. For the week ending February 23, latest for which figures are available, more than six thousand cases were reported.

This is less than were reported the week before, but health authorities believe the drop is only temporary. The peak in number of cases is not due for another two or three weeks. Scarlet fever cases always increase gradually from early fall until a high point is reached in the middle of March, when the number of new cases falls off sharply again. The present increase is considered the regular seasonal one, but it is much greater than any for the past six years.

Measles is also widely prevalent. Nearly as many cases are being reported this year as last, when the largest number ever recorded was reported.

The general deathrate and cases of meningitis and smallpox have all risen slightly this year. Health authorities are not worried about this, however, as the record good health of the country in 1933 and the early part of 1934 was so unusual that it could not be expected to last.

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ASTRONOMY

100-Inch Telescope Mirror Now Wears Aluminum Coat

THE GIANT 100-inch diameter mirror of the Mt. Wilson world's largest telescope now wears a coat of reflecting aluminum instead of conventional silver.

Dr. John Strong, California Institute of Technology physicist who developed the process for putting aluminum surfaces on glass mirrors in a vacuum, breathed a sigh of relief when the biggest job he has ever undertaken came to a successful conclusion.

Astronomers foresaw similar coating of the still larger 200-inch mirror now cooling at the Corning Glass Works. Moreover, they were remembering the potential savings of millions of dollars