

the influence of many small haphazard factors, storms, floods, fires, dry spells, etc. Each of these or any combination of one or

more of them might occur in any one year, their total effect being entirely random.

Science News Letter, August 25, 1951

RADIO

Trans-Continent Television

Coast-to-coast TV network made possible by opening of a transcontinental radio-relay system for radio telephone and also television.

► TELEVISION transmission across the continent has now become possible with the opening of a transcontinental radio-relay system installed by the American Telephone and Telegraph Company. It is primarily for telephone service but it also will provide a coast-to-coast TV network.

This radio-relay system will permit for the first time telephone conversations across the country by radio rather than by wire or cable. The eastern half has been in use for some time and is already sending television programs as far west as Omaha.

The new western half, now opened for telephone, is expected to be equipped to handle east-west television by the end of next month. Another channel, west to east, will be in service a few weeks later.

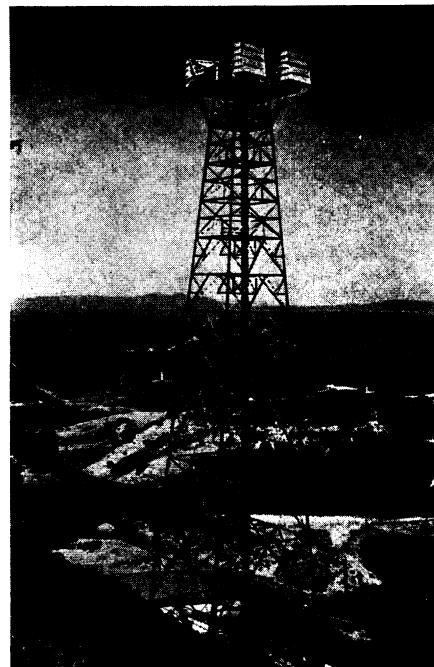
This radio-relay installation, the longest microwave system in the world, uses 107 relay towers spaced about 30 miles apart. Each picks up the radio signals from a tower to its east or west, amplifies them

and retransmits them beamed on the next tower in the line.

Messages will ride super high frequency radio waves in the 4,000-megacycle range. This means 4,000,000,000 cycles. Ordinary radio broadcasting range is from 550,000 to 1,600,000 cycles. Radio waves used in the relay system are about three inches in length as against the 1000-foot waves for frequencies in the middle of the standard broadcast band. Amplifying equipment in each relay station boosts the power of the radio signals 10,000,000 times.

What makes this new relay system possible include a new electronic tube which gives super high frequencies, a greatly improved metal lens and a unique system of filters representing an entirely new contribution to the field of communications. This radio-relay is not intended to replace present transcontinental wires and cables. It will supplement them.

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RELAY—This is one of 107 radio relay stations on the Long Lines transcontinental system. The relays are mounted on a 200-foot steel tower.

know-how. Ideas alone can give us the vital margin of superiority in technological warfare, and original ideas spring from basic research.

"We dare not forget the lesson of the last war. In 1940 the Nazis stopped their research. They thought the war could be won on weapons and warfare devices already developed and in production. Three years later they tried desperately to restore a strong research effort. It was then too late. They missed three of our most important military assets: microwave radar, the proximity fuse, and the atomic bomb.

"We cannot afford to miss."

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GENERAL SCIENCE

Urge Full Funds for NSF

► POINTING to the "desperately critical situation" in the United States with respect to scientific manpower and the lack of basic knowledge which "seriously delays" technical progress in field after field, Dr. Alan T. Waterman, director of the National Science Foundation, has urged Congress to appropriate the full \$14,000,000 it requested for the fiscal year 1952.

Dr. Waterman's statement was made after the House Appropriations Committee had cut the budget request down to \$300,000. No money was to be allowed for either a fellowship program or research support at educational institutions, the statement stating that the committee "after much consideration and with some reluctance, has denied funds for these two programs, which make up in excess of 90% of the estimate, with the idea that their early aid in the present emergency is not very tangible."

The House was to have acted on the appropriations bill early this week, but scientists were pinning their hopes on the Senate for at least partial restoration of the cut.

In his statement Dr. Waterman pointed to the desperate shortage of scientists, en-

gineers and technicians. He said that the number of engineering graduates would decline at an alarming rate during the next three years.

"The defense budget has increased four-fold and the military research and development effort more than threefold," he declared. "The demand and urgent need for scientists and engineers will rise accordingly. Instead, the supply is decreasing in inverse ratio to the demand."

Of the \$14,000,000 asked, \$5,060,000 was to be for the support of 2,100 graduate fellowships in the sciences and engineering, he said.

"Research support has equal bearing on the emergency," Dr. Waterman stated. "Today, the time-lag between the discovery of a basic scientific principle and its exploitation and application has all but disappeared in great technological areas, many of significance to defense."

Dr. Waterman declared that this country needs a defense in depth in research and development.

"This means," he pointed out, "that we must mobilize all of our technological resources—basic research, applied research, development, engineering and production

INVENTION

Improved Aviation Gasoline Beters Operation and Power

► BETTER FUEL of the high-octane type for military and civilian airplanes is claimed in a composition which brought patent 2,560,898 to Walter A. Schulze and John E. Mahan of Bartlesville, Okla. Phillips Petroleum Company, Bartlesville, has been assigned right to this improved fuel.

The product is what chemists call an isoparaffinic aviation fuel. This contains a relatively minor proportion of a compound which gives rich-mixture characteristics without undesirably affecting the other characteristics of the fuel. The additive is minor portions of methyl substituted pyridines.

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