

ENGINEERING

# Television For All

The G-string will make possible a nation-wide television network, besides having other applications as in radar. It promises to supplement the coaxial cable.

By A. C. MONAHAN

➤ EVERY American home, because of a new carrier, may soon be within reach of television programs.

A new "G-string" single-wire system of transmission from station to station will permit an economical nation-wide network with local broadcasting centers to reach practically all of the country.

These local broadcasting centers will be, in effect, relay stations to receive programs by wire and put them out on the air. Stations are already doing this but they are receiving their programs over intricate, costly coaxial cable, the expense of which limits expansion.

## May Replace Coaxial Cable

This new G-string system may replace coaxial, according to the present outlook. It will have many applications in addition to television. Important are those in connection with radar. It gives wide promises in telephony because many conversations can be transmitted over it at the same time.

Television range and radio range are quite different. Practically every home in the country can now receive radio programs. Those in many small-town and rural areas cannot get television. Ordinary radio waves have a tendency to follow the curvature of the earth. Television waves travel in straight lines and, because the earth's surface is curved, soon are too high in the air to be receivable on the surface.

Radio waves follow the curvature of the earth largely by bouncing back and forth between the surface of the land or water and atmospheric layers high above. The high frequency waves used in television, and also those used in FM (frequency modulation) radio, bounce back and forth to a lesser degree.

Both television (TV) and FM transmission are "line-of-sight" broadcasting. Their energy waves are ordinarily receivable only within the horizon. This means, in general, some 40 to 60 miles although they are sometimes picked up at distances twice as great. TV and FM stations on high towers have greater range, and a few that have been erected atop high isolated mountains have greater range still. The high frequency radio waves used in modern systems of communications with airplanes are receivable some 200 miles away if the plane is high in the air. In that case there are no land formations to cut the transmission path.

The ordinary single wire used for telephone or telegraph transmission can be used only for very short distances with television. The loss in transmission is too great. The intricate coaxial cable, developed primarily to carry a multitude of telephone conversations at the same time, is highly satisfactory for television.

## Cable Is Costly

But coaxial cable is costly to construct and to install. The cost is warranted where telephone usage is high, but not yet for television. Its present use for TV is largely only during the periods of low telephone load.

Ground-based relay stations are coming into wider use for television transmission. They are placed on high land some 40 miles apart. They pick up the TV signals and, after amplification, put them on the air again but beamed to the next relay in the system. In that way they keep the TV signals following the earth.

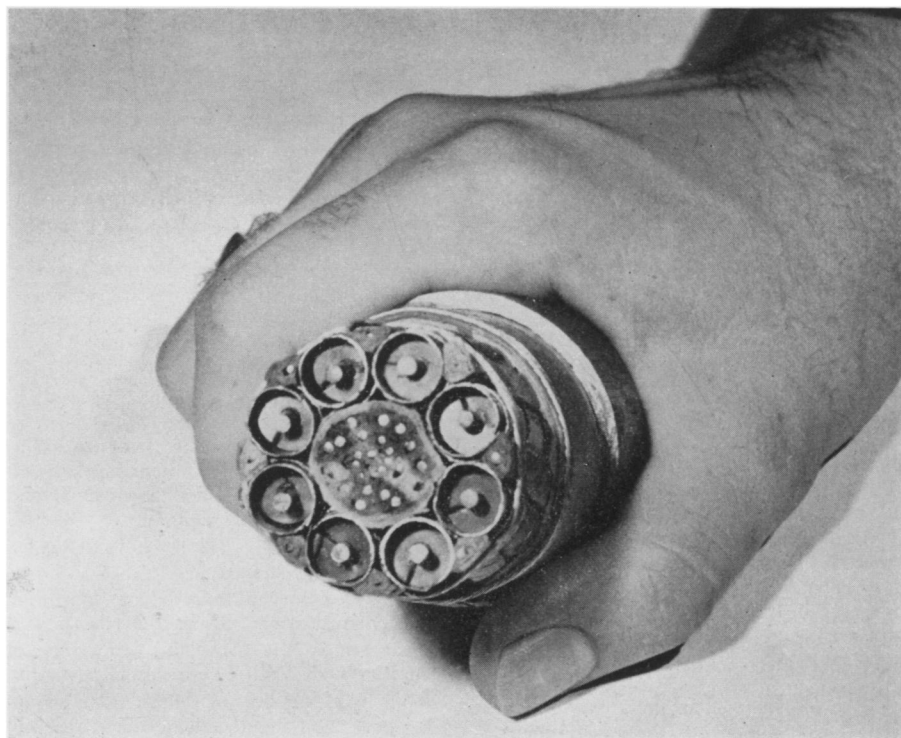
The new single-wire system for television

transmission, dubbed the G-string after Dr. Georg Goubau, the inventor, was developed at the U. S. Army Signal Corps Laboratories, Fort Monmouth, N. J. It was first announced at a late winter meeting of the Institute of Radio Engineers in New York. It is a single wire with a special dielectric coating, and with funnel-shaped terminals.

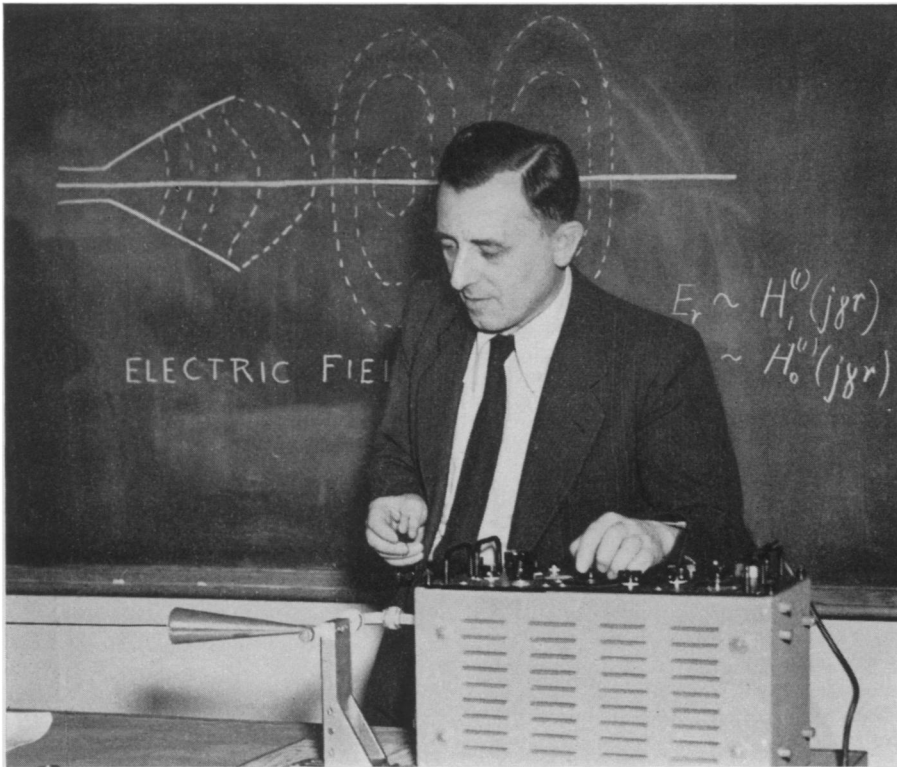
## G-String Inventor

The inventor is a German scientist who was brought to this country since the war to assist in American work. He got his idea for his invention from a paper published in 1899 by Prof. A. Sommerfeld of the University of Munich. This paper had to do with wave propagation along a cylindrical wire. There was no thought at that time of TV transmission. In those days, television was probably not even a dream.

In Dr. Goubau's invention, the single-wire used is coated with a thin layer of a dielectric material, that is, non-conductive material. He used both an enamel and a coating of polystyrene. This layer results in a shrinkage in the cross-section of the electric field surrounding the wire, helping maintain its strength. The funnel-shaped terminal at the sending end helps keep concentrated the magnetic field lines which are in circles around the wire. The horn at the receiving



**COAXIAL CABLE OF YESTERDAY**—Comparable to the heavy, bungle-some skirts of yesteryear is the thick, intricate and expensive coaxial cable which has been used heretofore in television transmission and which may be outdated by the G-string.



**G-STRING OF TOMORROW**—Dr. Georg Goubau, of the Signal Corps engineering laboratory, is shown with the wire, the G-string, which promises to supplement the coaxial cable in bringing television to every American home.

end gathers in those within the area of its aperture.

Signal Corps officers have pointed out that, although this invention will be of civilian use, it will be of even more importance in the armed services, particularly in radar. It may make practical, they said, the development of a videophone. By this, two persons could hold a long-distance telephone conversation, "both parties seeing each other."

"The new Signal Corps line could carry a hundred such video-phone conversations simultaneously on a single wire," they stated, "compared with the ability of today's single coaxial cable to carry only one."

### 8,500 Channel Miles

Even without the G-string, the television network of the United States is rapidly expanding. Some 8,500 channel miles now inter-connect 25 cities having 50 television broadcasting stations, according to the American Telephone and Telegraph Company.

The overall coaxial network was extended over another 1,100 miles of route during the past year, bringing the total to 7,600 miles. Radio relay facilities were also completed over a half dozen or more short lines, and relay facilities are under construction by the company that will connect New York with Chicago, Des Moines and Omaha.

Coaxial cables now in use carry from one to four pairs of copper tubes, within each

of which is a wire insulated from the tube by disks. Each are made to carry up to 600 telephone circuits. With three pairs in use, a cable can carry 1,800 simultaneous conversations.

Science News Letter, June 3, 1950

### MEDICINE

## Sailors' Health Menace: Dust from Moths' Wings

► A HEALTH menace to sailors is reported from Norway to the JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION (May 6).

Caripito itch is the name of it and it is caused by hairs from the wings and abdomens of moths belonging to the family *Saturniidae*, genus *Hylesia*.

The disease gets its name from Caripito, a harbor on the San Juan River in Venezuela. News of it reached Dr. J. Boe of the City Hospital of Bergen, Norway, when he received the following radiogram from the captain of a Norwegian 16,000-ton tanker in the Atlantic:

"If possible, telegraph medical advice for so-called Caripito itch. Cause: dust from the wings of moths. The whole crew attacked. The rash reminiscent of primula (primrose) flower. Violent itching. No fever. Have given remedies for itch, but result negative."

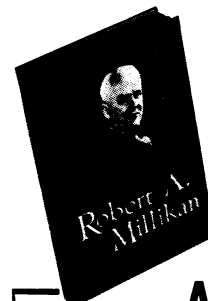
Dr. Boe had never heard of this condition and could find nothing about it in medical textbooks or from consulting skin specialists.

He recommended ephedrine tablets and frequent washing with weak solution of ammonia. Two days later the captain reported that his patients were getting well.

Later the captain wrote that 41 of the crew of 44 had suffered Caripito itch. He said he had visited the harbor before without this mishap, but that the harbor master had warned him about it.

Dr. F. M. Urdaneta of Caripito reports that seamen on tankers coming from this port, which has been open since 1935, are subject to the complaint and that it is the hairs of the moth wings and abdomens which cause the trouble.

Science News Letter, June 3, 1950



## "MILLIKAN: MAN OF SCIENCE AND OF GOD"\*

THE REVEALING MEMOIRS of a Nobel Prize winner and one of the most eminent physics scholars of modern times—whose work in science has helped to change the world's thought. "Millikan's story gives an example of the characteristic contributions that America has made to the growth of modern thinking, and an understanding of some of the factors that have brought America into its present position as a world leader . . . It is fortunate that the author has used his autobiography to express his mature thought on certain major issues, such as: the requirements for peace, the essentials of a good education, and the vital place of science and religion in life . . . Perhaps, however, in no field are the author's comments of greater significance than in that of science and religion . . . I do not know where to find a more illuminating book than this. It is authoritative and eminently readable. It includes valuable source material . . . This autobiography is an important contribution to the understanding of what is perhaps the greatest age of history. I expect it to be read for many years to come."—\*Arthur H. Compton, Nobel Prize physicist, N. Y. Times Book Review

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