

surgeon is not dangerous. It is done under local anesthetic and the patient usually need not stay in the hospital more than three days.

Dr. Haynes advises this operation for these one-sided headaches when conservative treatment, such as by drugs, X-rays and traction on the neck, fail

to give relief. Patients sometimes have headaches after the operation, but in such cases medicines, sometimes ordinary headache remedies, relieve the pain.

In a series of 47 patients the operation gave relief in 87%. Conservative treatment brought relief in only 32% of 25 patients.

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the wires which are in your radio. Tiny tubes are soldered to the flat surface. Small batteries such as are used in hearing aids supply the power for the sub-miniature station.

But the engineer is even more proud of one of his larger models, a vest-pocket transmitter and receiver which is a duplicate of one Dr. Brunetti presented to President Truman.

If you are looking forward to the day when you will be able to get one of these tiny radios, the National Bureau of Standards has good news for you. A recent survey revealed that more than 65 manufacturers have already begun to use printed circuit techniques in some of their products. So far, these flat, smaller circuits are not finding their way into many radios, but many manufacturers are working on this problem.

At least one hearing aid is now using the printed circuits and plans for two-way personal radios have been announced. When the latter gets on the market, they may find some unique uses. Dr. Brunetti showed the radio engineering group how a large store might use the midget transmitters for a routine inventory. One clerk could count the stock, broadcasting the figures to an office where they would be recorded and tabulated. The idea for this use of the tiny radios came to the Bureau of Standards from an executive of a large chain store.

The Bureau worked on printed circuits for the wartime proximity fuze. Since the war Dr. Brunetti and his staff have shown how these circuits can be used in industry and perhaps one day in your own pocket or handbag.

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ASTRONOMY-GEOGRAPHY

Solar Eclipse to Help Accurate Mapping of Earth

► THE shape and size of the earth will be determined with greater accuracy than ever before when the moon comes between the earth and the sun on May 8-9.

A multiple expedition to Burma, Siam, China, Japan, Korea and the Aleutian Islands, all along the path of the eclipse, is being planned by the National Geographic Society. Simultaneous observations to be made at these points will aid in making better maps of the earth.

Because the path of the eclipse crosses the International Date Line in mid-

RADIO-ASTRONOMY

Cosmic Static Jams Radio

► RADIO noises broadcast from the sun and stars cause picture jumpiness and streaking to appear on television, and can drown out FM broadcasting stations, Grote Reber, radio physicist at the National Bureau of Standards, declared.

Mr. Reber discussed cosmic radio sounds as the guest of Watson Davis, director of Science Service, on the Adventures in Science program heard over the Columbia network.

"Cosmic noise from the Milky Way is undoubtedly one of the major factors limiting the distance that FM and television can transmit," said Mr. Reber.

Cosmic static also affects other high frequency equipment such as certain types of radar and aircraft safety instruments. He added that this static doesn't affect the ordinary radio in our homes. This is because the lower frequencies of the cosmic noise which would disturb the standard broadcast band cannot reach the surface of the earth through the ionosphere, an upper layer of the earth's atmosphere.

"Cosmic static begins to interfere on frequencies above 15 megacycles, and begins to slope off above 100 megacycles," Mr. Reber explained. "However, it is at this point that solar static starts to come in."

Static from the stars was first noticed and picked up in 1932, and this was when Mr. Reber began his own study on this subject. In his home town in Illinois, he set up his equipment. A big saucer, 30 feet in diameter, captured the signals from outer space, where they were absorbed by a drum, then transmitted down to a meter which registered the intensity of received radiation. It looked like a giant mushroom, Mr. Reber recalled.

"People there got so used to seeing my equipment that I could always spot strangers in town by the fact that they'd stop to take a look," Mr. Reber said.

He added to the equipment, using

his own money, and worked in the quiet hours of the night when there was less disturbance from passing automobiles.

The project became too big to handle alone, and with the rush to higher frequencies, the results began to have real practical importance. Mr. Reber joined the staff of the Bureau of Standards. His equipment was moved to Virginia and will receive broadcasts from the Milky Way. A set of German Giant Wurzburgs, a radar brought back from Germany, receives broadcasts from the sun.

Next steps are to attempt to pin-point the sources of the two types of static and to study their frequencies and variations. Mr. Reber believes there is the possibility that these radio noises could be used to make an analysis of outer space.

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RADIO

Broadcasting Unit Is Size of Fifty-Cent Piece

► LATEST version of the business tycoon who started "on a shoestring" may be the radio station owner of the future who starts on a half dollar. The "half-dollar radio station" was demonstrated to the local section of the Institute of Radio Engineers in Washington by Dr. Cleo Brunetti, engineer at the National Bureau of Standards.

Dr. Brunetti is the man who carries a whole "network" of radio broadcasting transmitters around in his pockets. He built a radio transmitter which fits conveniently in an empty lipstick container. His "calling card radio" is on a thin plastic card the size of a calling card. And the half-dollar broadcasting unit is on a square which would barely cover a 50-cent piece.

The thin plastic square measures one and one-quarter inches each way. Flat painted lines form the circuits instead of