

## PHYSICS

**Progress Made in Sending Electricity Without Wire**

► SENDING useful amounts of electricity through the air without wires, a goal of scientists for 65 years, is now closer to reality.

Progress in the wireless transfer of electrical power was reported to the international convention of the Institute of Electrical and Electronic Engineers in New York. Radio, TV and radar also operate by wireless energy. However, large amounts of power, thousands of watts, have to be broadcast for small, scattered amounts, only a few thousandths of a watt, to reach receiving antennas.

To transmit electrical power efficiently without wires, the beam has to be focused. Scientists at Raytheon Company, Burlington, Mass., have beamed several hundred watts of power over a distance of 25 feet with 25% overall efficiency, Dr. W. C. Brown reported to the meeting.

Although 25% may not sound very efficient, it is considered a major step forward. Both the distance and the power level could be increased a thousand times using existing devices, Dr. Brown said.

Some uses for which efficient wireless energy might be practical include changing the direction of satellites in orbit, operating radio and TV equipment in satellites, and keeping a helicopter some ten miles in the air to use it as a radio transmission tower for educational TV or for an early warning system for missile attack.

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## TECHNOLOGY

**Breaking the 'Bumper' Brakes the Vehicle**

► A NEW SHOCK ABSORBER, built for spaceships, has solved the problem of stopping a hard impact smoothly with no recoil or "bounce-back" action.

Springs like those used in an automobile have too much rebound. Pillow cushioning is not effective in gently stopping the impact of, for example, an automobile colliding with a highway guard rail. Neither helps in slowing elevators and other hard-hitting equipment.

The National Aeronautics and Space Administration, however, has designed a shock absorber that is lightweight, inexpensive, has no recoil and breaks on impact.

The principle is demonstrated when an automobile collides with a tree. As the shock of collision is absorbed, the front of the automobile is crushed and broken.

NASA has designed a lightweight aluminum tube that, on impact, slips like a pair of trousers down a fixed leg and is crumpled against a metal foot. Pieces of the tube break off as the vehicle slows to a stop.

Energy of the moving ship must be absorbed somewhere. The act of breaking the tube on the front of the ship absorbs this energy and lands the ship smoothly without any bounce, which uses up the energy.

Some aluminum alloys can use up 31,000 foot-pounds of energy, or the amount of energy needed to move 31,000 pounds one foot, per pound of tubing. New tubes could easily be installed for the next landing.

John R. McGehee, Melvin Hathaway and Edmond Zavada of NASA developed the system at the Langley Research Center, Hampton, Va., and a patent is pending. The Government will make non-exclusive licenses available for commercial use.

The same principle can be put to work wherever a hard impact must be cushioned. Potential uses include protection of expensive and delicate machinery during shipment, mountings for passenger seats, extra "give" in seat belts and backing for auto bumpers to prevent the crushing of vehicles and lives.

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## PSYCHOLOGY

**When Ma and Pa Fight, Johnny Reads Poorly**

► FRICTION between the father and mother is one answer to the question of why Johnny cannot read.

"Group guidance" sessions with feuding parents and consultation with teachers can result in notable improvement in reading ability, the American Orthopsychiatric Association meeting was told in Chicago.

Dr. Harris B. Peck and a team of researchers at the Albert Einstein College of Medicine, Yeshiva University, New York, reported that children whose parents cooperated in the sessions made significant gains in reading even over a short period.

A "reading readiness test" given routinely by the New York City Board of Education to all children before the end of their first school year was used by the Einstein researchers, who found it to be a valuable clue in predicting which children were likely to become poor readers.

Sixty children who scored 50% or lower on the test without being mentally retarded were selected by the investigators as most likely to have later reading difficulties.

Without interviewing the children themselves, the Einstein group consulted regularly with their teachers and held guidance sessions with the parents independently.

Children who are slow learners because of emotional problems should not be mixed in classrooms with those who have low intelligence ratings, teachers said during consultations. Overcrowded classrooms and overdemanding parents also were blamed for the fact that bright children cannot learn to read.

Some parents maintained that their children were shy, read well while at home, but were so frightened of school and the teacher that they could not perform well in the classroom.

Drs. Israel Zwerling and Meyer Rabban, with Marilyn Mendelsohn, collaborated with Dr. Peck in the Einstein studies, which were supported by a grant from the National Institute of Mental Health, Bethesda, Md.

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**IN SCIEN**

## ENGINEERING

**Guard Pay-TV Channels Against 'Knotholing'**

► MAJOR TECHNICAL breakthroughs in the field of electronics are safeguarding special pay-TV channels against "knotholing" by non-paying viewers.

While a picture and sound security system for pay-TV need not meet the rigorous requirements of a military security system, it must be good enough to make pay-TV "pay off," the international convention of the Institute of Electrical and Electronics Engineers was told in New York.

The best security system for pay-TV includes a special device located between the antenna and the television set. The device would not physically change the set in any way or affect its guarantee, Ira Kamen, executive vice president of Teleglobe Pay-TV System, Inc., said.

The system should also have arrangements for centralized metering and billing at the end of the month instead of sending a person in to collect coins from the set.

Pay-TV programs are broadcast over the air and over coaxial cables on three special channels. A newly patented device developed by Teleglobe plugs into the video line at the broadcasting station and encodes it with a key signal that distorts the television picture for ordinary receivers.

Persons paying for the privilege of receiving programs on the special channels have a decoding device attached to their receiver, which detects the key signal and unscrambles the picture. At the same time, it alerts the central metering and billing office that the program is being picked up.

Non-paying viewers receive only a scrambled picture and no sound. Through pay-TV, viewers can receive all the fights, first-run movies within 30 days of their appearance at local theaters and some plays.

Those major cities on this continent that either receive pay-TV programs now or will by 1965 include Denver, Los Angeles, San Francisco, Toronto, Washington, Houston, Little Rock, Chicago and Dallas.

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## SPACE

**Astronaut Rocket Pack Designed for Back**

► ASTRONAUTS someday may move from one spaceship to another by means of a newly designed rocket worn on the back of space suits. Drawn up for the National Aeronautics and Space Administration by Honeywell, Minneapolis, the device would control the astronaut's movements in space, enabling him to begin or stop his motions in a weightless environment. Firing of the rockets would be soundless since there would be no air to carry the soundwaves.

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# CE FIELDS

## AGRICULTURE

### Plants Are Thriving In Salty Water

► PLANTS are being watered down with seawater—and thriving.

Wheat in India, barley and bright carnations in Israel, potatoes and gladiolas in Spain, sunflowers in sunny Italy, and many other plants are being grown experimentally in salty water throughout the world, stated Dr. Hugo Boyko, ecological advisor in the Ministry of Agriculture of Israel.

Interesting experiments also are being made on the death of plants, Dr. Boyko said at a lecture delivered under the joint auspices of the New York Academy of Sciences and the World Academy of Art and Science in New York.

Plants that had been irrigated with seawater easily survived a drought period of nine months without irrigation or rainfall, he said. Plants of the same species which were irrigated with freshwater died during the drought.

Reporting on the irrigation of Israel's sandy desert soil with saltwater, Dr. Boyko reported that 180 species of plants were introduced successfully in the gravel and sand slopes flanking the Gulf of Eilat in southern Israel. These slopes, once completely barren, were turned into a verdant recreation park of six acres after several years of irrigation with saltwater.

At first the agricultural researchers used brackish water drawn from deep underground, Dr. Boyko reported. But then experiments were continued with seawater up to the oceanic concentration of 3.5% salt content.

Now an international chain of experimental stations is carrying on this work throughout the world.

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## MEDICINE

### Grant Made for Study of Hepatitis Viruses in Blood

► HOW TO DESTROY hepatitis viruses in the blood and how to keep alive and nourish transplanted organs are among problems to be attacked with a multimillion dollar grant awarded by the National Heart Institute, Bethesda, Md.

It is the largest grant ever made for blood research.

The grant to the New York Blood Center will be distributed over the next seven years and may total \$10 million.

The precise amount will be determined by the yearly needs, Dr. Robert L. Ringler, chief of the Institute's program projects branch, told SCIENCE SERVICE. The annual sum will be about \$1.3 million.

Eventual removal or destruction of the hepatitis virus is expected to be one result of the increased research. Another is a better

understanding of the part blood plays in the body's tendency to reject transplanted organs.

The first research, financed by an initial grant of \$703,104, will include genetics, plasma proteins, blood coagulation and long-term preservation of blood and other human tissues. The hepatitis virus and immunology research will come in 1965 and 1966.

The center will also serve as a research resource in blood and provide special materials and services needed by investigators at other institutions. These could include complete blood typings for persons studying genetics or anthropology, plasmas with specific clotting defects needed by researchers in blood coagulation, and the isolation or characterization of special plasma protein factors.

Dr. Ringler said the U.S. Public Health Service decided to award this huge grant to the New York Center because it is devoted exclusively to blood and community health.

"Blood research, of course, is going on at many sites," he said, "but the work of the center will have wide importance, extending internationally as reports are written."

Blood transfusions saved thousands of lives of fighting men in World War II, but most of the technology concerning blood has been developed since the war.

The research will be carried on by Drs. Aaron Kellner, director of the center at 310 E. 67th St., New York; Fred H. Allen Jr., director of laboratories; Kenneth Woods, expert in protein chemistry, and other outstanding researchers.

The center is a nonprofit institution established in 1963 by the N.Y. Community Blood Council.

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## SURGERY

### Heart Valve Replaced In Baby First Time

► THE FIRST KNOWN successful heart valve replacement in a baby—by an artificial device—has been reported. Although valve deformity at birth is rare, the fact that so young a child could survive such an operation opens the way to surgery for more common heart problems in babies.

The valve surgery was done at Montefiore Hospital, New York, on a ten-month-old baby girl whose left mitral valve was affected at birth by "stenosis," or narrowing, that caused fainting spells. Congestive heart trouble would have caused her death by the age of two without the artificial valve.

The hour-long operation was made possible by a heart-lung bypass machine called a pump oxygenator that kept sufficient blood flow and oxygen in the baby's body while her own heart was immobilized.

The size of the artificial valve opening is expected to be sufficient during childhood, but continued follow-up study will be necessary to determine when a larger valve must replace the present one.

Drs. Dennison Young and George Robinson reported the case in the New England Journal of Medicine, 170:660, 1964.

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## TECHNOLOGY

### Long-Distance Telephone Blackboard Developed

► YOU CAN WRITE on a "blackboard" in New York and have it appear on a screen several thousand miles away with a new device developed by the General Telephone & Electronics Corporation.

The device transmits handwriting in the form of voice-frequency electronic tones over long distance telephone lines, while the classroom lecturer is writing. The electronic tones are received by another one of the devices in a faraway college and rebroadcast over the college's closed-circuit TV system.

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## GEOPHYSICS

### Ionosphere Used to Study Sun's Cosmic Rays

► U.S. SCIENTISTS are bouncing radio signals off the earth's radio reflecting roof, the ionosphere, in an attempt to learn more about the mysterious cosmic rays emitted by the sun.

Cosmic rays constantly smash into the earth's atmosphere. Those that come from the sun are more likely to be concentrated at the earth's geomagnetic poles. As solar cosmic rays increase and decrease, the number of ions or charged particles in the ionosphere rises and falls.

By bouncing high frequency radio waves off the ionosphere, using a technique known as "forward scatter," scientists at McMurdo Station, Antarctica, hope to learn more about the rays while the sun is at a low point in its 11-year cycle of activity.

The equipment "watches" points on the underside of the ionosphere midway between each of several pairs of transmitters and receivers on the Antarctic ice cap. The narrow radio beam hits ions that have been smashed by cosmic rays, scattering the signal in a forward direction. The radio signal gets louder or quieter at the receiving set, depending on the number of ions the scattered signal has encountered.

Sponsored by the National Science Foundation, the project is among many investigations planned by scientists of 66 nations throughout the International Years of the Quiet Sun (IQSY), 1964-65, when solar activity is at a minimum.

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## TECHNOLOGY

### New Light Aircraft Brake Reduces Pedal Loads

► A NEW LIGHT ring-shaped aircraft brake has a self-energizing feature that reduces pedal loads to levels usually achieved only in power brake systems. Developed by Goodyear's Aviation Products Division in Akron, Ohio, the brake represents the only innovation in light aircraft brakes in almost 20 years.

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