

# Technology Notes

## MICROWAVE POWER

### **Fuelless Copter to Use Microwaves**

A helicopter that can fly for days carrying no fuel supply is being developed for the Air Force. It will receive its power via microwave radiation beamed up from earth.

Presently undergoing test stand flights, the nine-foot-long experimental craft uses new solid-state diodes in its power receiving antenna and rectifier, which together weigh only two pounds yet put out 1,000 watts of power. Being developed by Raytheon Corp., the helicopter is planned as a relatively stationary antenna platform for both military and civilian communications.

## SATELLITES

### **Canada Wants Its Own Comsats**

The Canadian Science Secretariat reports that Canada will need seven communications satellites by the end of the century, and that the country will have to make up its mind whether it wants to own its own or rent them from the U.S.-dominated Communications Satellite Corporation.

The first one, equipped to handle data, voice and TV, will be needed by 1970, the scientific group says, with three more in the next decade, a fifth by 1990 and the last two by the year 2000. The report forecasts that for at least 10 years it will be necessary to pay the U.S. or Europe to do the launching.

Canada must develop its own small-satellite launch capability, however, the Secretariat warns, with perhaps four launches by 1975 as a break-even point in operating the facilities. A presently-operating rocket range at Churchill, Manitoba, might be extended to include satellite launch facilities. Canada will assume full responsibility for this range when its launch agreement with the U.S. expires in 1970.

## SPACE PROPULSION

### **Strongest Rocket to Be Fired**

The most powerful single rocket motor ever ignited is being readied for a June firing.

More than 5.4 million pounds of thrust will be produced by the 260-inch solid-propellant motor, made for the National Aeronautics and Space Administration by Aerojet-General Corp. The motor's increase in thrust over two previous ones of the same dimensions comes from use of a larger nozzle and a propellant with a faster burning rate.

Mixing and pouring the motor's 1.6 million pounds of propellant took 18 days, working around the clock. The firing will mark the first time that a "submerged" nozzle, one recessed into the motor itself, has been used on a solid propellant motor of such size. This type of nozzle is desirable for use with thrust vector control devices.

## ASTRONAVIGATION

### **The Search for Straight Down**

As part of Project Profile, a study to help astronauts accurately determine which way is literally straight down, Lockheed Missiles and Space Co. is studying the edge of the earth.

Straight down, as represented by a line from a spacecraft to the center of the earth, is difficult to estimate in zero-gravity. A small angular error, negligible on earth's surface, is magnified tens of thousands of times when it originates in a high orbit. Since landmarks that could help are often obscured by clouds, the likeliest solution to finding the "local vertical" line appears to be by measuring the earth's radiation limb, the outer edge of emitted, scattered and refracted light from the planet as seen from outside the atmosphere. Lockheed is studying the characteristics of the limb, and says that by 1969 or 1970 the Air Force could be prepared to launch an unmanned satellite to make accurate measurements.

## COMPUTERS

### **Stethoscope for Computers**

An electronic "stethoscope" has been developed to help engineers keep track of what goes on inside their computers.

Developed by International Business Machines Corp., the Systems Activity Measuring Instrument records the time, sequence and distribution of events in a computer, and also counts the events and classifies and correlates its own data. The computer can be examined during its normal operation without interruption.

## COMMUNICATIONS

### **Vietnam Gets Battery Testers**

Reliable, maintenance-free battery-testers for the many kinds of rescue radios and beacons being used in Vietnam have been developed by the Air Force Systems Command at Wright-Patterson AFB, Ohio.

The prototypes were designed and built in only 27 days from "personal and scrounged" parts, then field tested in Southeast Asia. The testers need neither controls nor calibration, and are powered by radio frequency energy radiated by the device they are testing. More than 800 have been distributed.

## AIR TRAFFIC CONTROL

### **Air Control System Gets Unknotted**

The Air Force's new Tactical Air Control System, still under development, is so complicated that 22 companies have been asked to submit proposals for ways to integrate its more than 50 major components into a workable, handleable system.

TACS includes tactical radars, communications facilities, control towers, operations centers and power generators. The highly mobile system will be able to handle direct air support, air control and warning, air traffic control and command communications.