

engineering sciences

Gathered at the Institute of Electrical and Electronics Engineers convention in New York last week

ELECTROMAGNETIC COMPATIBILITY

FCC clampdown

The interference to communications from electromagnetic devices has reached serious proportions. In some areas, such as police and fire communications, it is critical. Using the authority granted to it in 1968, the Federal Communications Commission will issue, in two or three months, rules requiring the manufacturers of electronic equipment to comply with FCC standards. Previously, only users of interference-producing equipment were bound by FCC rules.

The FCC expects these rules to be a major step toward reducing the amount of interference, says Herman Garlin, chief of the radio frequency devices branch.

COMPUTERS

Video panel displays

Manufacturers of computer terminals are working toward the goal of a flat panel display; that is, they want to reduce the space taken up by the electronic equipment behind the viewing screen.

Two of the most promising candidates for constructing the flat panel display are the light-emitting diode (LED) and the gaseous plasma cell, according to Dr. G. R. Kaelin of Litton Industries, Inc., in Van Nuys, Calif. Because these tiny devices are capable of emitting a good deal of light with a low voltage input, they can eliminate much of the bulky equipment now needed to produce a luminous readout.

The LED is made from a new semiconductor material, gallium-arsenide-phosphide. It works by having surplus electrons in one region of the material flow into vacancies in another region. As a result, the electrons give up energy in the form of red light. The surplus and the vacancies are created by doping with different impurities.

The plasma cell is similar in operation to a fluorescent light. Voltage applied to one electrode causes electrons to flow to another, ionizing neon gas in between. The ionized gas emits orange light.

OPTICS

Infrared imaging system

Conventional infrared devices are limited to the near infrared portion of the spectrum. In addition, when operating in the far infrared, devices need constant focusing, cryogenic cooling or the agglomeration of thousands of discrete bits of polycrystalline materials to make an intelligible image.

A new system called an upconverter has been devised by RCA Laboratories in Princeton, N.J., which in addition to overcoming these problems can produce a three-dimensional color image from infrared waves. Basically, the system is composed of a crystalline material, such as potassium dihydrogen phosphate, into which are beamed and mixed the infrared waves and laser light, explains Dr. Arthur H. Firester. The laser beam pumps the infrared photons into visible light. The system, suc-

cessful in the laboratory stage, has worked as far as 10 microns into the far infrared region.

DIGITAL CIRCUITS

Gigabit computer this year

The four-minute-mile for electronics engineers has been the gigabit computer, a computer that can process a billion bits of information per second. For the past 10 years, three problems have stood in the way: circuitry, interconnections and cooling.

William T. Rhoades of Hughes Aircraft Co., in Fullerton, Calif. says engineers are on the threshold of their goal, and should make it this year.

The three problems have been overcome by new microminiaturization techniques, which have resulted in smaller circuits. These in turn have permitted more circuits to be placed closer together, thus reducing the number of the interconnections that delay electron transfer. However, the reduced size has increased the heating problem. To overcome this, engineers have switched from air cooling to a liquid coolant—Freon.

COMMUNICATIONS

Machine for the mute and deaf

The deaf and the mute can now communicate with others or themselves over the telephone with an invention by Cybernetics Research Institute, Washington, D. C. The device, called Cyberphone, is a portable telephone communication system that fits inside an attache case. It consists of a panel of buttons and lights with the 49 letters, symbols and numbers found on a typewriter. There is also a place to hold a telephone receiver.

To use the machine, the sender places the receiver in the set, spells out his message using a keyboard push button system. It is transmitted via pulse-coded signals through the telephone system to another Cyberphone set, where it is either read directly from flashing lights on the panel, typed out on a typewriter or recorded on tape for playback at a later time.

MICROWAVES

Avalanche diode in plane radar

An avalanche diode is a semiconductor junction device in which an electric current creates a chain reaction, or avalanche effect, among the electrons. The result is the generation of large amounts of microwave power from a tiny source.

The avalanche diode has been developed to the point where it could replace the large vacuum tube in some aircraft radar systems, says Dr. K. K. N. Chang of RCA Laboratories. At present, many military planes communicate with coded radar signals, usually generated by vacuum tubes. By using pulsed microwave signals, the avalanche diode could perform the same job and take up less space. It could offer the same potential for radar communication in commercial aviation.