

## ELECTRONICS

# Robot Electronic System

Fully mechanized system for rapid production of electronic equipment revealed. Modules, developed under "Project Tinkertoy," replace conventional parts.

## See Front Cover

► MACHINES INSTEAD of men now can do the biggest part in producing desperately needed electronic equipment for the armed forces during manpower scarcities.

The National Bureau of Standards and the Navy's Bureau of Aeronautics have now revealed "Project Tinkertoy"—a mechanized production system for supplying new-design radar and radio sets in great quantities to the armed services in times of emergency.

Proposed in 1948 by the National Bureau of Standards, the system has now been developed to the point where it is considered an apparent solution to industrial mobilization during periods of national crisis. A working pilot plant in Arlington, Va., has proved the worth of the robot electronic system.

Technically known as Mechanized Production of Electronics, the new system is built around the idea of a basic circuit part called a module. A thousand modules can be produced in an hour. The module is an array of several wafer-like squares of a ceramic material.

Upon each ceramic wafer is printed a section of an electronic circuit. Threads of silver form the wiring and special adhesive tape makes up the resistors. Tiny ceramic condensers and vacuum tube sockets then are added where needed.

Several of these wafers then are machine-assembled to form the module, a major subassembly in the electronic gear being produced. The modules can be put together to form the radar set, radio or electronic bomb sight.

A wafer and two modules are shown on the cover of this week's SCIENCE NEWS LETTER.

The desirability of the new system lies in its flexibility, production speed and minimum manpower requirements. Major improvements can be worked into the equipment on the assembly line within 24 hours. Thus if a device designed for the tropics suddenly must be modified for Arctic warfare, the time lag in its production can be cut 75%.

Few men are required to run the plant. Technical know-how is stored on punched cards that feed metal-fingered robot "hands" with the necessary information.

The system is mechanized even to the point of automatic mechanical and electrical inspection, dictated by the tiny holes in the cards. All this gets around the need

for hiring and training large crews of technicians—men whose special skills might be critically needed elsewhere.

During peacetime, the system can be used to produce civilian electronic equipment. It also can be balanced to manufacture both civilian and military equipment at the same time.

Science News Letter, October 3, 1953

## CHEMISTRY

## Polyelectrolytes Used As Blood Substitutes

► HERE IS a new word for your scientific vocabulary: polyelectrolytes. It is in the news because Yale University has announced a \$10,000 grant from the California Research Corporation of San Francisco will be used to support studies in the general field of polyelectrolytes.

Some of these substances are being used instead of blood plasma for transfusions. Others are the basis for soil conditioners that make clay soil tillable and prevent the effects of wind and rain erosion.

Research on these substances originated at Yale, says Prof. Raymond M. Fuoss who will administer the grant. It will be used to finance a year of uninterrupted studies for young men who have shown promise in

their research work and who have had from three to five years of teaching experience.

James C. Nichol, associate professor of chemistry at Willamette University in Salem, Ore., has been appointed the first recipient of a fellowship supported by the new grant. He will spend the next year conducting research at Yale under Prof. Fuoss.

Science News Letter, October 3, 1953

## ENGINEERING

## Room Inside Room Yields Data on Radiant Heating

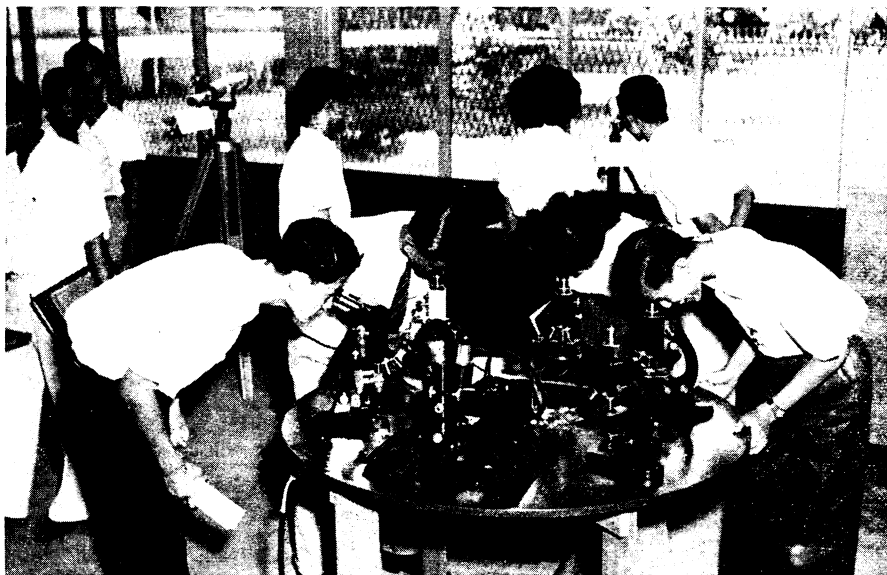
► ENGINEERS ARE using a room built within a room to check the qualities of a new household radiant heating system that has cooling and heating coils buried in ceilings.

The idea is to find out how much hot or cold water must be pumped through the ceiling pipes, and what its temperature should be, to keep a room comfortable during summer and winter.

The test room at the Armour Research Foundation of the Illinois Institute of Technology in Chicago is surrounded by another room. Heavy insulation between the two rooms keeps outside conditions from affecting the experiments within. About 150 thermocouples constantly measure temperature at different points in the test room. Data gathered by the thermocouples have been recorded in graph form to expedite its interpretation by engineers.

One wall of the test room represents a large window. Its inside surface can be regulated to simulate the scorching heat of a summer day or the frosty temperature of a winter night.

Science News Letter, October 3, 1953



MICROSCOPES ON VIEW—Modern microscopes are demonstrated in Bangkok, Thailand, at the science exhibit of the United Nations Educational, Scientific and Cultural Organization at the Arab Science Congress on human senses.