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THE COVER: In Electron Tube Development Laboratory, E. J. Zimany uses U-shaped torch to drive out gases from traveling-wave tube. Gases are then removed by vacuum-pump apparatus on which the tube is mounted. See opposite page for story of vacua.

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THE COVER: D. B. Penick measuring carrier voltages in an L3 terminal at the Murray Hill Laboratory. (See page 72.)

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THE COVER: Photomicrograph of surface of germanium, showing dislocation etch pits (magnification about 150 diameters). Crystal treated with ultrasonic vibration during growth by R. M. Mikulyak; micrography by E. E. Thomas. For story on use of dislocations in the study of crystallographic structure, see page 104.

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THE COVER: A 3½-inch "spinal" column of wires feeds its 5,000 nerve fibers to marker-circuit relays in experimental No. 5 crossbar equipment at Bell Telephone Laboratories.

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THE COVER: In Bell Laboratories Chemical Physics Department, the familiar crystal-growing apparatus is here designed to operate in a vacuum. Vacuum around a well of molten germanium permits addition of aluminum and boron as "impurity" agents. E. D. Kolb monitors machine as vertical shaft "pulls" a crystal out of the melt.

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THE COVER: Experimental apparatus used by the Metallurgical Research Department in its study of the purification of silicon. H. C. Theuerer is observing silicon material mounted in quartz tube. Molten zone is established on top surface of silicon bar to avoid contamination from external sources.

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THE COVER: Soldering lead to positive contact area of a silicon solar cell, which converts sunlight into electrical power. Negative lead is later soldered to center of disc to make one cell of a Bell Solar Battery (see opposite page).

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THE COVER: Solderless connections made with a new tool (see opposite page) that cuts the wire, removes the insulation, and wraps the wire around the terminals in one rapid operation. Magnification about ten diameters.

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THE COVER: An actual barium titanate crystal matrix containing 256 storage cells. (See page 335.)

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THE COVER: Handset of a volume control telephone coupled to an artificial ear in the foreground. The output of the ear is applied to an oscilloscope to check the transmission quality of set. See article on opposite page.

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THE COVER: Horn reflector antenna at the Holmdel Laboratory facing Murray Hill Laboratories twenty miles away for transmission tests. (See opposite page.)

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THE COVER: An optical code wheel mounted with a bank of phototransistors in a way that might be useful for registering data such as the angular position of a shaft; see page 445.

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