

data and handle computations—on a silicon chip.

Today the most densely packed ICs feature nearly 100,000 components on a chip five millimeters across, wired together with aluminum conductors roughly 30 times thinner than a human hair. Colin Norman sums it up in his *Worldwatch* paper: "In three decades, a roomful of vacuum tubes, wires, and other components has been reduced to the size of a cornflake. And the process is not over yet... [C]hip manufacturers are confident that by 1990 they will be able to produce integrated circuits containing at least one million components."

In an April 14 interview with *BUSINESS WEEK*, Intel's founder and vice chairman, Robert N. Noyce, described the microelectronics era as the second industrial revolution. "We are just at the beginning of mechanizing... intellectual activity," Noyce adds. Norman suggests that this, in fact, marks the profound difference between the microelectronic and industrial revolutions. "The development of industrial technology largely enhanced human physical capabilities," he says, "enabling people to harness more energy, process and shape materials more easily, travel faster, and so on. But the development of microelectronics extends mental capabilities... and it enables electronic 'intelligence' to be incorporated into a broad range of products and processes."

In fact, no technology in history has had such a broad range of potential applications. Increasingly sophisticated computer-controlled robots are invading industry to slash production costs, time and labor requirements. Reprogrammable machinery now makes it economically feasible to automate processes involving short production runs and frequent changes in machine settings, which, Norman claims, constitute the majority of manufacturing processes. "Intelligent" microprocessor-based office machines portend the elimination of filing and routine clerical work as the electronic—and perhaps one day paperless—office becomes the norm. Even the highly skilled toolmaker is in jeopardy. What's more, Norman says, "if, as most experts are predicting, the chief impact of microelectronics is felt in offices, women workers are the ones who will bear the brunt of the new technology."

Resistance to microelectronics will ultimately prove counterproductive, however, says Norman, because "failure to adopt the new technology courts the risk of massive job losses as domestic industries decline." But simply hoping that the unemployment problem will disappear is not a feasible policy either in the current period of slow economic growth and rapid technological change, he says.

What is needed, Norman emphasizes, are both "early warnings" for workers whose jobs are now in jeopardy, and a voluntary retraining of those workers for tomorrow's jobs. □

Cosmonauts land after record flight

Appearing healthy and happy, Soviet cosmonauts Leonid I. Popov and Valery V. Ryumin returned to earth Oct. 11 from a record-setting 185 days in space aboard the orbiting station Salyut 6, the Soviet news agency Tass reported. The six-month flight surpasses by 10 days the previous Soviet record—in which Ryumin also participated—and far outstrips the U.S. record of 84 days,

set in 1974 by Gerald Carr, William Pogue and Edward Gibson. Intended in part as an investigation of the effects of weightlessness on human function, the 185-day space sojourn seemed to have no ill effects on the health of the cosmonauts, Tass reported. In fact, the agency said, Popov gained about 6½ pounds and Ryumin gained about 11 pounds. Their condition differed significantly from that of previous record-holders Ryumin and Vladimir Lyakhov who had difficulty walking and talking after their 175-day flight (SN: 8/25/79, p. 132). Soviet mission scientists attributed Ryumin and Popov's well-being to a careful regimen that included eating normal foods and exercising. The cosmonauts also made observations of the earth's land and ocean surface and experimented with the manufacture of crystals, metal alloys and other materials in a gravity-free environment. Such experiments were intended to determine if materials manufactured free of gravity would have exotic properties that might be important for industries on earth. □



Ryumin (left) and Popov after landing Oct. 11.

Toxic shock: Questions and suggestions

Toxic shock syndrome is still a conundrum, but suggestions are being made that might help women avoid the sometimes-fatal disease.

The puzzle has to do with the cause. Some researchers suggest that toxic shock syndrome is simply a new name for an old disease (as appears to have been the case with Legionnaires' disease) and that it has nothing to do with tampons (victims have included women who did not use tampons and some men). The Center for Disease Control in Atlanta, Ga., however, is sticking with the tampon theory. CDC officials told a Food and Drug Administration panel last week that so far this year there have been 408 cases of the syndrome linked to tampon use, and 40 of the victims have died. This is an abrupt increase in the incidence of the disease over previous years.

"It is unlikely that this syndrome represents a new observation of an old disease," say four physicians from Massachusetts General Hospital in a letter to the editor in the Oct. 9 *NEW ENGLAND JOURNAL OF MEDICINE*. "The dramatic nature of the presenting symptoms in otherwise healthy women," they explain, "seems to exclude previous lack of recognition." They propose, instead, that "the appearance of the toxic shock syndrome in recent years may be related to a change in tampon design and construction." Newly designed tampons expand severalfold and can block the vaginal opening completely. The physicians, Arlan F. Fuller Jr., Morton N. Swartz, John S. Wolfson and Ronnie Salzman, suggest that this blockage of the

vaginal outlet can cause a reflux, or backflow, of toxin-containing menstrual blood from the vagina through the fallopian tubes into the peritoneal cavity where the toxin can be absorbed rapidly and cause toxic shock syndrome. This sequence of events, explains Fuller, would result in toxic shock syndrome only if the blockage of the vagina and subsequent reflux were accompanied by a toxin-causing bacterial colonization (for example, by *Staphylococcus aureus*, the suspected organism).

Whether or not this answer solves the riddle remains to be seen. In the meantime, the FDA continues to take steps toward preventing the disease. The agency has already put a stop to the sale of the heavily implicated Rely tampons (SN: 9/27/80, p. 198) and is considering requiring that manufacturers put warning labels on the packaging of all tampons.

The American College of Obstetricians and Gynecologists makes even stronger recommendations. Last week they advised women to stop using all superabsorbent tampons until more research is conducted. They further suggest that women change tampons every six to eight hours and alternate tampons with sanitary napkins or minipads. Should a woman who is using tampons experience the symptoms of toxic shock she should discontinue tampon use and consult her physician immediately. The symptoms include high fever, vomiting, diarrhea, loss of blood pressure, a sunburn-like rash and, in some cases, shock. □