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# Aerospace

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## Factory in a rocket

A rocket in flight seems like an improbable place in which to try processing experimental materials, but researchers from NASA's Marshall Space Flight Center in Alabama are going to try just that. Three sounding rockets a year will be launched from 1975 through 1980 carrying ovens and other equipment to study the effects of melting, resolidifying, surface tension and other phenomena in near weightlessness. Such studies began on Skylab in 1973 and will continue aboard the shuttle in the 1980's.

The rocket-borne experiments are to bridge the gap, in hopes of refining the limited Skylab data before the shuttle begins its flights. The Skylab research showed that there may be significant gains to be had in such fields as semiconductors and composite materials from allowing materials to solidify in an environment in which convection, sedimentation, mass-distribution stresses and other gravity-related effects are minimal.

The ballistic rockets will provide from 6 to 10 minutes of low gravity (.0001 times earth's surface gravity) for tests of composites, superconductors, semiconductors, free alloys, oxide glasses, chalcogenide glasses and biological materials. NASA analysis suggests that this should be enough time to resolidify samples as large as those used on Skylab. Besides ovens, the rockets will carry "levitation devices," which will use acoustic or electromagnetic fields to suspend samples so that they can solidify without being in contact with container walls. This should let samples form without stress and contamination from physical contact.

## NASA looks toward 'the shelf'

Two of the major reasons for the high cost of man-made satellites are the need for longevity and the fact that each one has been made largely from scratch, with one-of-a-kind components and specially designed instruments. With the coming of the space shuttle, however, the space agency hopes to change much of that. One of several studies along this line is being conducted by TRW Systems group in California, which is looking for ways to use less costly instruments on the satellites to be launched by the shuttle.

The stringent reliability requirements of satellites can be relaxed somewhat, since the shuttle will be able to retrieve malfunctioning probes for service either in orbit or back on earth. There will also be more space and weight capacity available, and the TRW team is also exploring the possibility of using standardized electric power requirements and modular packaging, which could lead to the development of a variety of satellites using ready-made components that simply "bolt on" to a choice of standard frames. (Just such a multipurpose "basic satellite" has already been designed at NASA's Goddard Space Flight Center.) A major change in spacecraft engineering philosophy, the modular idea could do a lot to determine just how well the huge investment in the shuttle will pay off.

## More air passengers on less fuel in 1974

By eliminating, rerouting and slowing down various flights, U.S. scheduled airlines were able to carry about six million more passengers on a billion gallons less fuel in 1974 than in 1973, says the Air Transport Association. Slowing a 500-mile flight by a 737 from 520 to 500 miles per hour, for example, the ATA says, adds under three minutes to the trip time while cutting fuel consumption by seven percent.

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# Biomedicine

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## Nicotine from other smokers

The reasons for giving up cigarette smoking are plentiful—increased risk of lung cancer, heart disease, emphysema, gum disease, lowered sex drive and immune protection, giving birth to a low-weight baby, and making young children more susceptible to bronchitis and pneumonia (SN: 12/14/74, p. 376). Now add another reason: filling the body fluids of your family and friends with nicotine.

M. A. H. Russell of Maudsley Hospital in London and C. Feyerabend of New Cross Hospital in London studied the average concentration of nicotine in the urine of nonsmokers under natural conditions. They found that the concentration was 10.7 nanograms per milliliter. They put nonsmokers in an unventilated room filled with cigarette smoke for an hour and a half, and studied the concentration of nicotine in their urine. It was 80 ng per ml. They also studied the concentration of nicotine in the urine of cigarette smokers. The concentration varied from 104 ng per ml up to 1,236 mg per ml.

"As a result of passive smoking," the investigators conclude in the Jan. 25 LANCET, "most urban nonsmokers have measurable amounts of nicotine in their body fluids. . . ."

## Folk superstition and birth rate

Various factors have led to a drop in the birth rate in the United States during the past few years—better and more widely available contraceptives, the high cost of rearing and educating children and the liberation of women into the work force. Still another factor, however, appears to have influenced the drop in the birth rate among Japanese living in California and Hawaii in 1966. And that was the ancient Japanese belief that females born in the Year of the Elder Fire-Horse turn out to be monsters.

The Japanese myth states that females born in the Year of the Fire-Horse, which occurs every 60 years, are fiery, impulsive, anger quickly and destroy their husbands if they marry. The myth became a strong superstition in 1682 when a young maiden born in the Year of the Fire-Horse started a fire that almost destroyed Tokyo. It was reinforced during the 1930's when a young woman born in the Year of the Fire-Horse murdered her lover, cut off his penis and carried it around in her bosom.

Since 1966 was the Year of the Fire-Horse, Kanoe Kaku, a pediatrician with the Hiroshima Teishin Hospital, and Y. Scott Matsumoto of the University of Hawaii checked to see whether the fear of bearing females during that year influenced the birth rate among Japanese living in California and Hawaii. They report in the February AMERICAN JOURNAL OF PUBLIC HEALTH that it did. The birth rate dropped significantly that year, above and beyond the influences of contraception and a generally declining fertility pattern.

## Lead-induced hyperactivity

A year ago, Mitchell W. Sauerhoff and I. Arthur Michaelson of the University of Cincinnati reported that feeding lead to suckling rats made them hyperactive and depressed the nerve transmitter dopamine in their brains (SN: 12/8/73, p. 361). Michaelson and co-worker Marianne Golter have now repeated the experiment but obtained a different result. They report in the Jan. 25 SCIENCE that lead produced hyperactivity, but this time did not depress dopamine. Instead it elevated the nerve transmitter norepinephrine.