

Exhaust: Rockets to autos

Finding an efficient, long-lasting and inexpensive method of converting automobile carbon monoxide and hydrocarbons to less harmful exhausts is a key problem. NASA began work with the Environmental Protection Agency three years ago on the problem, and has continued to pursue it alone. Now NASA's Lewis Research Center may have a solution.

What they have developed is a thermal reactor which takes the place of the manifold. There hot engine exhaust is mixed with air to complete combustion of unburned gas to produce carbon dioxide and water. The problem was to find a liner material that would not fail due to oxidation. Lewis tested a number of ceramics and came up with silicon carbide. But the problem was that this brittle ceramic could be damaged by vibration and road shock. Now they have modified springs similar to those used to protect prototype nuclear rocket nozzles. The springs are between the ceramic liner and the metal reactor housing. To date the silicon carbide reactor has performed without degradation for 18,000 miles on a motor-pool car at Lewis.

A space-age test of human response

A complex coordinator machine, designed in 1965 by NASA's Langley Research Center to test astronauts' manipulative skills and determine how fatigue affects dexterity, has now been modified and built by J.W.M. Corp. of Philadelphia for commercial use.

The device ranges in price from \$5,000 to \$30,000, depending on the program. It could be used in biomedicine and rehabilitation, in testing persons' aptitude for various jobs, in law enforcement and highway safety, and in education for teaching physiology of muscle coordination. The psychomotor testing machine treats the human being as an integrated system—with stimuli and responses as inputs and outputs. The machine consists of a control console the size of a large electric typewriter, a display panel and four hand-and-foot controls. Manipulation problems are presented to the subject by flashing lights on a display panel. Using levers and pedals, the subject tries to match a given set of colored lights by coordinating use of his limbs. Accurate responses are time-limited and the problems are constantly changing.

Moving paralyzed muscles

Electrical impulses can move paralyzed muscles. NASA has been working for several years now to perfect a system that can be used by paralytics. Working with Rancho Los Amigos Hospital in Downey, Calif., the agency has now helped develop a connector that applies small electrical currents from an outside power source through tiny terminals embedded in the patient's skin.

Some of the technology was already in experimental use but there were problems. One was finding a compatible implant which attaches to the skin, growing to the terminal firmly and securely. NASA used high purity vitreous carbon.

Tiny platinum wires attached to small pads on certain nerve endings are brought up to the surface skin. But the connectors attached to make contact with the metal conductors in the implant would often rip the skin if there were a sudden movement. So Ray Cerrato's group at the Kennedy Space Center came up with a small, lightweight, inexpensive connector that would make good electrical contact but that would be easily dislodged in case of sudden movement.

march 3, 1973

Another pollution danger: Too few ions

Tired? Maybe your body hasn't been getting enough atmospheric ions lately. At least that's the theory of University of California bacteriologist Albert P. Krueger, one of the world's leading air ion researchers. Krueger has been experimenting with the effects of airborne ions on animals for almost two decades, publishing his findings in such journals as *PROCEEDINGS OF THE ROYAL SOCIETY OF HEALTH* (Britain) and, more recently, the *INTERNATIONAL JOURNAL OF BIOMETEOROLOGY*.

Mice, he observed, die more often from fungal, bacterial and viral diseases when the ratio of positive to negative ions is high in the air they breathe, or when the normal total number of ions falls abnormally low. Though Krueger has chosen to limit his own investigations to animals, he told *SCIENCE NEWS* that pollution causes a marked decrease in atmospheric ions which, he believes, could affect human health. He said studies by colleagues in Japan and Israel show that human subjects become listless and irritable when ion concentration is decreased under laboratory conditions and that people who "feel" impending changes in the weather may be reacting to ion level changes. The mechanism of reaction remains unknown, Krueger said, but research indicates some connection between atmospheric ion levels and the level of a brain chemical called serotonin, which, among other things, affects blood pressure.

The biggest quake of all

Midwesterners who chuckle smugly at jokes about California earthquakes may be in for quite a surprise, according to a report in the current issue of the *FIELD MUSEUM OF NATURAL HISTORY BULLETIN*. Author Edward Olsen reminds his readers that a series of faults, much less understood than the San Andreas system of California, lies just under America's heartland and that it was this system, not California's, that produced the country's greatest quake.

On an early winter morning of 1811, near the frontier settlement of New Madrid, Mo., a giant quake began to rumble, destroying the town, tumbling chimneys in Cincinnati, 350 miles away, and waking residents in Washington, D.C., 700 miles away. Log cabins apparently make fair earthquake-proof structures, for only one resident of New Madrid died in a collapsing house. But modern-day residents of Chicago, St. Louis and Memphis, Olsen warns, may not be so lucky. Much of Chicago, he points out, is built on shaly land-fill with some large buildings "floating" on caissons rather than set on bedrock. While scientists have measured the buildup of strain along faults in the active San Andreas system, and have predicted a major earthquake in the near future, the Midwestern system simply hasn't been studied that well. As a result, Olsen concludes, Midwesterners cannot afford to "indulge themselves in a feeling of complacency."

Solid wastes: A scorecard

Writing in the *AUDUBON*, Gary Soucie has compiled a scorecard of the country's fight against solid waste. The waste, he reports, is winning.

Items: Three quarters of the nation's annual 360 million tons of urban solid waste (enough to bury Connecticut a foot deep) is still taken to open dumps. About half of all soft drinks are still sold in disposable bottles. Eight million cars are junked annually, creating a pileup now estimated at 20 million cars—enough to girdle the earth.

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