MILITARY SCIENCE

"Audit" System Proposed

➤ A SYSTEM for monitoring underground nuclear blasts—called AUDIT, for Automatic Unattended Detection Inspection Transmitter—was presented at the National Convention on Military Electronics in Washington, D. C.

Its backers said AUDIT is designed to meet Russian demands that nuclear test bans be enforced without permitting foreign detection and inspection teams to invade Soviet privacy.

The AUDIT concept calls for "a substantial number" of monitoring stations, unattended and visited only rarely for maintenance or replacement, inside Soviet territory. Receiving stations would be established in friendly or neutral countries.

The stations would have to be small (1,000 to 2,000 pounds) and truck-transportable. They would operate from self-contained, long-life power sources, possibly using solar energy. They would have to be "tamper-proof and spoof-proof."

"One may think of the AUDIT station as a combination receiver, computer and transmitter," said Clark C. Abt, preliminary systems manager for the missile and space division of the Raytheon Company, Bedford, Mass.

Problems to be met, he said, include making sure the station will receive a signal from a low-yield underground burst, will be able to determine that the signal is not from an earthquake or a chemical explosion, and will have enough power to pass the message to the next relay receiver.

A system that will detect even the smallest bursts must combine and correlate both high-frequency seismic signals and low-frequency electromagnetic signals, he believes. More detailed knowledge of "the amplitude, frequency and duration" of electromagnetic signals from underground nuclear blasts would first be needed.

Weak links in the usual type of relay system reportedly could be eliminated by a "chain-reaction" communications network. Each station would be "equally capable of forming multiple links in the chain," so that communications would not be disrupted even if several stations were removed.

Mr. Abt said a "new and unique" coding technique, allowing chain-reaction signaling without interference, has been developed by Raytheon. Low-frequency ground wave propagation is used.

Each station in the chain would require only enough power to reach the four stations nearest to it. Only a few simple signals would have to be transmitted.

Initial cost per station is estimated at $500,000, including seismic and electromagnetic sensors, electronic data processing and communications equipment, power supply, a tamper warning device, construction and packaging. On this basis, a network of 3,000 stations would cost one and a half billion dollars.

Mr. Abt said the system cost by countries and geographic regions should be estimated and used as "a basis for determining the global political and economic feasibility" of the proposal.

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SPACE

TV for Astronaut Training

➤ A TRAINING device for future astronauts was proposed at the National Convention on Military Electronics in Washington, D. C. It is a closed-circuit television system that would duplicate, as closely as possible, the visual environment of outer space.

The project presented by T. F. Buddenhagen of Bell Aerosystems Company, Buffalo, N. Y., involves a large training "theater" with three high-intensity projectors and three screens.

The trainee would be placed in a model control room behind a mockup of the space vehicle, near the center of the "theater." There he would see televised images of the earth, the planets, the stars, the moon and the sun—realistically lit and in their proper geometric relationships—as they would appear during an actual flight.

One studio would generate the basic picture of the star field. A second would use a turning globe to show the earth as it appears from high altitudes, with a battery of spotlights for the imitation "sun." The third studio would show a space station model for simulation of orbital rendezvous conditions. Different models could be used in simulated flights covering approaches to the moon, earth and other planets.

The relative motions of all the bodies concerned would be coordinated and synchronized in the composite picture. New camera tubes and circuitry systems must be developed before all simulation requirements are met, Mr. Buddenhagen said.

Since actual space vehicles are not available for training missions, he pointed out, simulation facilities are important in determining control systems and "tasks which may be reasonably assigned" for manned space flight.

Manned vehicles are expected to have windows for "visual communication with the external environment," despite the extra weight. Periscopes and television viewing systems also may be used. Manned craft may have a front window, possibly covered with a heat shield until the high-temperature portion of re-entry is passed, and one or two side windows, kept shuttered or heavily filtered.

The astronaut must avoid looking at the sun, Mr. Buddenhagen said. Because the sun's light is not diffused by the atmosphere, it remains directional and there will be no warning that the sun is near the visual field. For this reason, the astronaut will probably open a window shutter only when he desires to look out.

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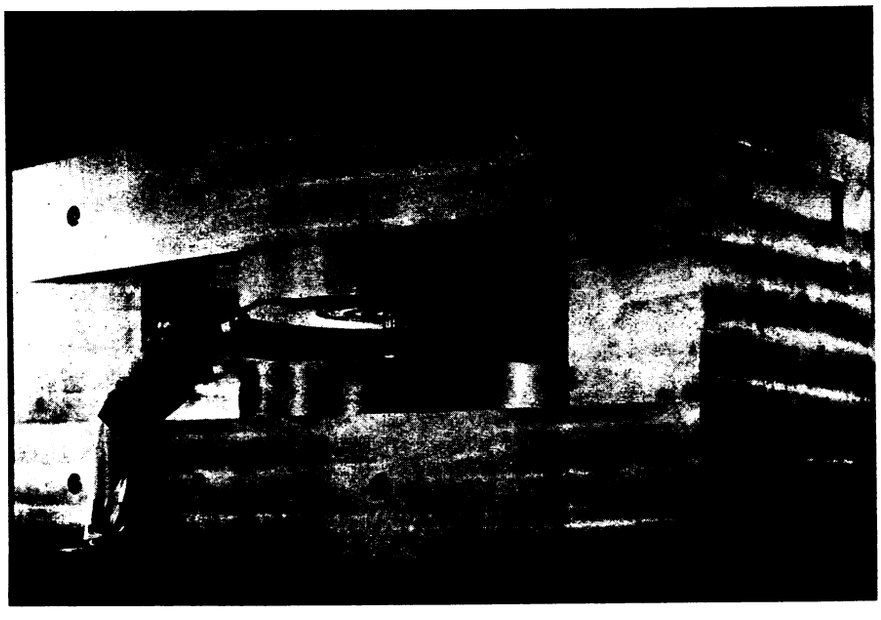

GIANT MAGNET—A 275-ton steel electromagnet, produced by the United States Steel Corporation, Pittsburgh, Pa., will be part of an 88-inch cyclotron under construction at the University of California's Lawrence Radiation Laboratory. The magnet, financed by the Atomic Energy Commission, will control the acceleration of some million billion atomic particles per second and permit nuclear experiments not possible before.